MA023254

PRODUCTION ENGINEERING MEASURE FOR IMPROVED RELIABILITY OF METALLIZED POLYCARBONATE CAPACITORS

FINAL REPORT

PERIOD: JUNE 8, 1967 - JANUARY 28, 1976

TO

U. S. ARMY ELECTRONICS COMMAND

FORT MONMOUTH, NEW JERSEY

CONTRACT NO. DAABO5-67-C-2707

Approved for public release; distribution unlimited.

SPRAGUE ELECTRIC COMPANY NORTH ADAMS, MASSACHUSETTS

Copy available to DDC does his parall felly legible reproduction

Security Classification				
DOCUMENT CONTROL DATA - R & D				
(Security classification of title, body of abstract and indexing	annotation mast be			
1 ORIGINATING ACTIVITY (Corporate author)		1	ECURITY CLASSIFICATION	
Sprague Electric Company	_		classified	
North Adams, Massachusetts 01247		BE GROUP		
3 REPORT TITLE				
Production Engineering Measure For I	manmayad D	diability c	of Matallizad /	
			i Wictalii zed	
Polycarbonate and Metallized Polysulfo	one Capacit	ors. ~		
4 DESCRIPTIVE NOTES (Type of report and inclusive dates)	The second second	 -		
Final Report, David & June 8, 1967-V.	Tan cia y (282	19 76)		
T AUTHORIS (First name, middle initial, last name)				
Adelson, Leonard				
Adelson, Leonard				
L Foheman +074	78. TOTAL NO	OF PAGES	7h. NO OF REFS	
1 represent the contract of th	348			
BE. CONTRACTOR TRANT NO	98. ORIGINATOR	TEPORT NUM	48 E R(\$)	
DAAB05-67-C-2707				
6. PROJECT NO	A120-38			
	25.05.55		other numbers that may be excigned	
°с.	thie report)	ORT NOTS! ANY	differ hubblere that may be everyled	
1 d	1			
10. DISTRIBUTION STATEMENT				
i				
11 SUPPLEMENTARY NOTES		MILITARY ACT		
,	1	•	onics Command	
,	Fort Mon	mouth, Ne	w Jersey 07703	
	Attn: AM	SEL-PP-I	-P-I-1	
The objective of the work proj	gram for pr	ocess im	provement and testing	
of production lots of metallized polyca	rbonate filn	n and meta	allized polysulfone film	
hermetically sealed capacitors was to	a failure ra	ate under s	static test conditions	
with a goal of . 002% per 1000 hours fo				
of each for 10,000 hours. The origina				
hours based on testing 23,000 metalliz	ed nolvear	onate film	capacitors However	
the contract modification deleting 11,5	00 of metal	liced poly	carbonate film (anaci-	
the contract modification determs 11,500 of a shalling	and policial	fone film.	canacitors changed the	
tors and substituting 11,500 of metalli	zeu porysur	ione iiiii (00 hours . In aspeticular	
maximum attainable FR for each diele	ctric to . 00	12% per 10	oo nours, in particular	
effort was concentrated in the process		ent phase	in these argas:	
(a) Quality of metallized film			*	
(b) Heat Treatment of capaci	tor sections	5	•	
(c) Shringe of film				
(d) Solvent entrapment within	the film			
(e) Burn-in of the completed				
Information pertinent to the p	rocess fact	ors evalua	ated and results obtaine	
in each area are detailed and the engin				
In each area are accurred and me engin	CC. MIE GEEL	CAULTO ILLE	(

DD FORM .. 1473

pre-production and production lots are delineated.

Unclassified

Units were tested in conventional oven chambers with special inserts for

mounting capacitors at rated voltage at 12500 fc 10,000 hours. Tests resulted (over)

Unclassified
Security Classification

Unclassified
Security Classification

PRODUCTION ENGINEERING MEASURE

FOR IMPROVED RELIABILITY

OF METALLIZED POLYCARBONATE AND

METALLIZED POLYSULFONE CAPACITORS

FINAL REPORT

Period: June 8, 1967 - January 28, 1976

Object of Study: The object of this production engineering measure is to improve production techniques for the manufacture of Metallized Polycarbonate and Metallized Polysulfone Capacitors to attain a maximum failure rate of 0.001% per 1000 hours with a 90% confidence level.

U. S. ARMY ELECTRONICS COMMAND

Fort Monmouth, New Jersey 07703

Contract No. DAAB05-67-C-2707

Report Prepared by:

Report Approved by:

Leonard Adelson

W. C. Donelan J. Fisher

SPRAGUE ELECTRIC COMPANY
North Adams, Massachusetts 01247

ACCESSION for

NTIS Matte Swatton D

ENG BASE Section D

ACCESSION for

Approved for public release; distribution unlimited.

A 23

TABLE OF CONTENTS

		Page
SECTION 1	-ABSTRACT	1
SECTION 2	-PURPOSE	3
SECTION 3	-NARRATIVE AND DATA	
	3.1 General	7
	3.2 Description of Capacitor	9
	PART 1 METALLIZED POLYCARBONATE FILM	
	CAPACITOR	
	3.3 Process Improvement Phase 1	17
	3.4 Phase 2 - Test and Evaluation of Process	
	Improvements	47
	3.5 Phase 3 - Reevaluation of Sources and Pro	cess
	Improvements	81
	3.6 Selection of Material Source and Process	
	Improvements	97
	3.7 Phase 4 - First Article Tests	98
	3.8 Phase 5 - Production Run of Metallized	
	Polycarbonate Capacitors	117
	PART 2 METALLIZED POLYSULFONE FILM	
	CAPACITOR	
	3.9 Phases 1 and 2 - Process Improvement,	
	Test and Evaluation	167
	3.10 Phase 3 - First Article Tests	178
	3.11 Phase 4 - Production Run of Metallized	•
	Polysulfone Capacitors	194
SECTION 4	-PROCESS AND CONTROLS	
	4.1 General	301
	4.2 Problem Areas	307
	4.3 Work in Problem Areas	310
	4.4 Conclusions	318
	4.5 Process Yields	330
	4.6 Equipment and Labor Requirements	332
SECTION 5	-CONCLUSIONS	334
SECTION 6	-PROGRAM RECOMMENDATIONS FOR ADDITION	NAL
	LFFORT	339

TABLE OF CONTENTS (CONT'D)

		Page
SECTION 7	-CONFERENCES, PUBLICATIONS AND REPOR	TS
	7.1 Monthly Reports	341
	7.2 Quarterly Reports	34 l
	7.3 PERT Chart	341
	7.4 Inspection and Quality Control Plan	341
	7.5 Tirst Article Test Reports	342
	7.6 Conferences	342
SECTION 8	-DISTRIBUTION LIST	344
SECTION 9	-IDENTIFICATION OF PERSONNEL	
	9.1 Identification of Personnel	348

LIST OF TABLES

Table	Description	Page
I	Production Engineering Measure - Program Phases for Metallized Polycarbonate Capacitors	10
п	Production Engineering Measure - Program Phases for Metallized Polysulfone Capacitors	11
ш	Incoming Inspection of Metallized Polycarbonate from Domestic Source A	22
IV	Incoming Inspection of Metallized Polycarbonate from Foreign Source B	23
v	Shrinkage of Metallized Polycarbonate Film	28
VI	Section Requirements for Process Evaluation	30
VII	Effect of Heat Treatment on Electrical Performance	e 34
VIII	Phase I Burn-In Electrical Results	44
IX	Phase 1 125°C Insulation Resistance After Burn-In	45
х	Effect of Heat Aging on Burn-In of Metallized Polycarbonate Capacitors	46
xı	Evaluation Testing of Source A Domestic Metallized Polycarbonate Group A and B Test	48
XII	Evaluation Testing of Source B Foreign Metallized Polycarbonate Group A and B Test	56
XIII	Evaluation Testing of Source A Domestic Metallized Polycarbonate Group A and B Test	64

LIST OF TABLES (CONTID)

Table	Description	Page
XIV	Evaluation Testing of Source B Foreign Metallized Polycarbonate Group A and B Test	72
xv	Phase 2 Summary of Conformance Inspection Test Results	80
XVI	Phase 3 Reevaluation of Source C Material Section Loss At Winding	85
XVII	Reevaluation Testing of Source C Domestic Metallized Polycarbonate Group A and B Test	88
XVIII	Phase 3 Summary of Test Results Source C Material	96
XIX	Phase 4 Summary of Test Results - First Article Samples Specification MIL-C-39022	118
xx	MIL-C-39022, Table XII	122
XXI	Initial Capacities	123
XXII	Initial DF	128
ххш	Capacities	141
XXIV	Capacities	147
xxv	Delta Capacities	153
xxvı	Delta Capacities	159
XXVII	Phases 1 and 2 Metallized Polysulfone Section Test Results	172
XXVIII	Phases 1 and 2 Summary of Polysulfone Burn-In Results	175

LIST OF TABLES (CONT'D)

Table	Description	Page
XXIX	Phase 2 Group B Inspection of Metallized Polysulfone Capacitors	177
xxx	Initial Capacities	196
ıxxx	Initial DF	204
хххц	Capacities	211
XXXIII	Delta Capacities	217
XXXIV	Initial Capacities, Final Capacities, Delta Capacities	223
xxxv	Initial Capacities	278
xxxvi	Final Capacities	284
XXXVII	Delta Capacities	290
хххип	Military Specification Sheet	319
XXXIX	Process Yields	331
XL	Manufacturing Requirements	333

LIST OF ILLUSTRATIONS

Figure	Description	Page
1	Metallized Capacitor Section	12
2	Cross-Section View of Metallized Polycarbonate and Metallized Polysulfone Capacitors	13
3	Dimensions of Metallized Polycarbonate Capacitor	s 14
4	Dimensions of Metallized Polysulfone Capacitors	15
5	Shrinkage of Metallized Polycarbonate in Transver Direction	se 26
6	Shrinkage of Metallized Polycarbonate in Machine Direction	27
7	Heat Aging of Metallized Polycarbonate Capacitors	35
8	Heat Aging of Metallized Polycarbonate Capacitors	36
9	Heat Aging of Metallized Polycarbonate Capacitors	37
10	Heat Aging of Metallized Polycarbonate Capacitors	38
11	Heat Aging of Metallized Polycarbonate Capacitors	39
12	Heat Aging of Metallized Polycarbonate Capacitors	40
13	Test Oven	136
14	Test Oven, Racks Mounted	137
15	Capacitor Test Racks	138

LIST OF ILLUSTRATIONS (CONT'D)

F'igure	Description	Page
16	Series Resistor Panels	140
17	Connector Comparison	297
18	Rack Connectors	298
19	Process and Control Flow Chart - Metallized Polyca-bonate and Metallized Polysulfone	
	Capacitors	302

SECTION 1

ABSTRACT

The objective of the work program for process improvement and testing of production lots of metallized polycerbonate film and metallized polysulfone film hermetically sealed capacitors was to a failure rate under static test conditions with a goal of .002% per 1000 hours for each dielectric, based on testing 11,500 of each for 10,000 hours. The original contract goal had been .001% per 1000 hours based on testing 23,000 metallized polycarbonate film capacitors. However, the contract modification deleting 11,500 of metallized polycarbonate film capacitors and substituting 11,500 of metallized polysulfone film capacitors changed the maximum attainable FR for each dielectric to .002% per 1000 hours. In particular, effort was concentrated in the process improvement phase in these areas:

- (a) Quality of metallized films
- (b) Heat Treatment of capacitor sections
- (c) Shrinkage of film
- (d) Solvent entrapment within the film
- (e) Burn-in of the completed capacitor.

Information pertinent to the process factors evaluated and results obtained in each area are detailed and the engineering decisions incorporated into the pre-production and production lots are delineated.

Units were tested in conventional oven chambers with special inserts for mounting capacitors at rated voltage at 125°C for 10,000 hours. Tests resulted in a calculated failure rate of .002% per 1000 hours for the metallized polycarbonate film capacitors and .0056% per 1000 hours for the metallized polysulfone film capacitors due to one (1) failure at 1000 hours and termination of the entire test at 6000 hours due to test equipment malfunction.

SECTION 2

PURPOSE

The purpose of this Production Engineering Measure is as follows:

- (1) To provide the production engineering necessary to improve production techniques for increasing the reliability of metallized polycarbonate capacitors and metallized polysulfone capacitors.
- (2) To conduct process improvement studies with the aim of meeting a reliability level of 0.001% maximum allowable failure rate per 1000 hours with 90% confidence level when tested at rated conditions. The processes to be improved encompass the following:
 - (a) Incoming inspection of material and quality of metallized polycarbonate film and metallized polysulfone film
 - (b) Heat treatment

- (c) Excessive shrinkage of film
- (d) Solvent entrapment
- (e) Burn-in.
- (3) Perform all necessary matrix tests to demonstrate the capability of the improved production line and to verify reliability.
- (4) To Prepare and submit a management evaluation program, such as PERT, or an equivalent of approximately 75 elements, describing the work to be performed.
- (5) To manufacture and submit for approval 560 Preproduction

 Samples of Metallized Polycarbonate capacitors, and 256

 Preproduction Samples of Metallized Polysulfone capacitors,

 prior to their respective Production runs.
- (6) To design, develop and manufacture or procure all special tooling necessary for the success of the Production Runs.
- (7) To design, procure, or fabricate limited production equipment

 (on a one-of-a-kind basis) capable of manufacturing 3000 units

 per eight-hour shift.
- (8) To pr pare, prior to the Production Runs, an Inspection and

 Quality Control Plan in the form of a manual describing the

 in-process and end item inspection and Quality Control techniques
 to be used in the production of the capacitors.

(9) To perform Production Runs consisting of 23,000 units meeting specification MIL-C-39022 and Technical Requirement SCS-301 each of which is to be life tested for 10,000 hours. The Metallized Polycarbonate Production Run shall consist of the following:

Contract Item No.	Rating	Type	Production Run Quantity
lAL	0.10 mfd - 100 V	SCS-301B104K	1925
lAM	1.0 mfd - 100 V	£	1925
lan	4.0 mfd - 100 V	SCS-301B405K	1925
lAP	0.047 mfd - 200 V	SCS-301C473K	1925
1AQ	0.33 mfd - 200 V	SCS-301C334K	1925
lAR	1.0 mfd - 200 V	SCS-301C105K	1925

The Metallized Polysulfone Production Run shall consist of the following:

Contract Item No.	Rating	Type	Production Run Quantity
lBL	0.10 mfd - 100 V	SCS-301B104K	1925
lBM	1.0 mfd - 100 V	SCS-301B105K	1925
lBN	4.0 mfd - 190 V	SCS-301B405K	1925
lBP	0.047 mfd - 200 V	SCS-301C473K	1925
1BQ	0.33 mfd - 200 V	SCS-301C334K	1925
1BR	1.0 mfd - 200 V	SCS-301C105K	1925

- (10) To prepare a General Step II Report describing the production facility having an expansion capability to 6000 units per eighthour day.
- (11) To prepare and submit monthly reports, quarterly reports, a final engineering report, and bills of materials and parts.

SECTION 3

NARRATIVE AND DATA

3.1 General

The object of this Production Engineering Measure was to improve process and production techniques for the manufacture of Metallized Polycarbonate and Metallized Polysulfone Capacitors which under test would demonstrate a maximum failure rate of 0.002 percent per thousand hours at a 90% confidence level. The processes to be improved were Quality of Metallized Polycarbonate and Polysulfone Film, Heat Treatment of Capacitor Section, Shrinkage of Film, Removal of Entrapped Solvent, and Burn-in.

The capacitors were to conform to the requirements of specification MIL-C-39022 dated 6 February 1967, Electronics Command Technical Requirements SCS-301 with Amendment 1, dated 6 February 1967 and Electronics Command Technical Specification Sheet SCS-301/1 as applicable.

To achieve the objective of 0.002% failure rate it would be necessary to manufacture 11,500 capacitors of each dielectric in accordance with the applicable specification. These capacitors would then be tested for 10,000 hours at rated voltage at +125°C.

Zero failures in the resulting 115 million unit hours for each film would achieve the reliability level of .002%/1K hours pe. MIL-STD-690. If both types were combined, 001% per 1000 hours could be demonstrated. However, since there is no compatibility in the two dielectrics, such combination would be meaningless.

This Production Engineering Measure was divided into two parts. The first part consisted of process improvement, evaluation, manufacture, and testing of a minimum of 11,500 Metallized Polycarbonate Film Capacitors. The second part consisted of process improvement, evaluation, manufacture, and testing of a minimum of 11,500 Metallized Polysulfone Film Capacitors.

Testing of 11,500 capacitors with no failures for 10,000 hours at 125°C and rated voltage would produce a failure rate of 0.002% per thousand hours at a 90% confidence level.

Part 2 of the contract provided an opportunity for proving the feasibility of the use of Polysulfone film as a viable dielectric for the metallized capacitor system.

The work to be accomplished under this contract was divided into area of effort goals or phases. These phases were established based on the effort to be expended in each of portions of the overall program with a sequential flow of phase 1 through phase 5. Table I delineates the phase selection for the Metallized Polycarbonate program and Table II delineates the phase selection for the Metallized Polysulfone program.

3.2 Description of Capacitor

The capacitors for this Production Engineering Measure were electrostatic capacitors using either metallized polycarbonate or metallized polysulfone film obtained from a domestic source as the dielectric and electrodes. The nominal thicknesses for both films were 0.00025 and 0.00050 inches.

Two continuous layers of metallized film were concentrically wound to form a cylindrical section (Figure 1). The section was terminated with lead wires, assembled into a tinned brass tube, potted, and hermetically sealed. A cross-section of the assembly is projected in Figure 2. Six metallized polycarbonate capacitor ratings were manufactured in conformance with the electrical parameters and mechanical dimensions detailed in Figure 3. Six metallized polysulfone ratings were manufactured in conformance with the electrical and mechanical dimensions detailed in Figure 4.

TABLE

PRODUCTION ENGINEERING MEASURE - PROGRAM PHASES FOR METALLIZED POLYCARBONATE CAPACITCRS

Phase Effort	Process Improvements	Evaluation and Test of Process Improvements	Re-evaluation of Sources and Process Improvements	First Article Tests - Electrical and Environmental per MIL-C-39022 Table IX	Production Run and 10,000 hour test of 11,500 capacitors.
Contract Phase	Phase i	Phase 2	Phase 3	Phase 4	Phase 5

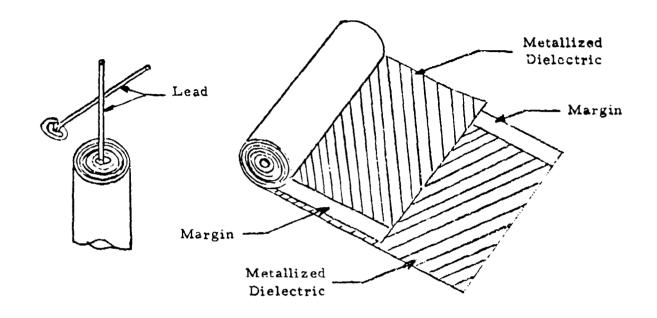
Note: Phases to be performed sequentially to completion.

TABLE II

PRODUCTION ENGINEERING MEASURE - PROGRAM PHASES FOR METALLIZED POLYSULFONE CAPACITORS

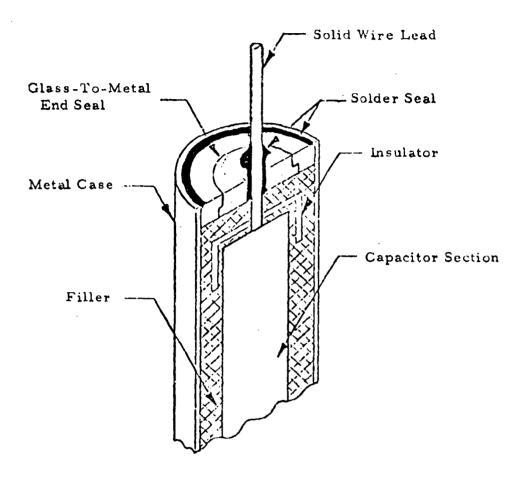
Phase Effort	Process Improvements	Test and Evaluation of Process Improvements	First Article Tests - Electrical and Environmental per MIL-C-39022 Table IX	Production Run and 10,000 hour test of 11,500 capacitors.
Contract Phase	Phase 1	Phase 2	Phase 3	Phase 4

Note: Phases to be performed sequentially to completion.



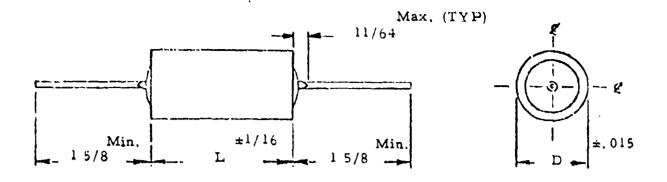
METALLIZED CAPACITOR SECTION

Figure 1



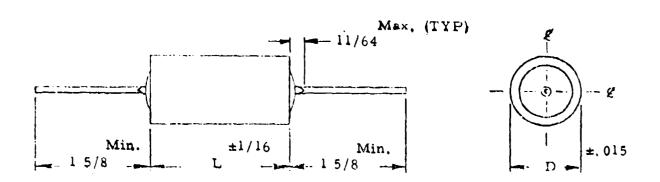
CROSS-SECTION VIEW OF METALLIZED POLYCARBONATE AND METALLIZED POLYSULFONE CAPACITORS

Figure 2



PART NUMBER	CAP ~10%	VOLTAGE RATING	D		LEAD AWG
SC\$301B104K	0.1	100VDC	.312	13/16	#22
SCS301B105K	1.0	100000	552	1.5/16	#20
SC\$301B405K	4.0	INDVDC	_Z50	2 1/16	#20
SC\$301C473K	0.047	200VDC	400	13/16	#20
SCS301C334K	0.33	200 ADC	.562	1 9/16	#20
SCS301C105K	1.0	1500ADC	.750	2 1/16	#20

DIMENSIONS OF METALLIZED POLYCARBONATE CAPACITORS



PART NUMBER	CAP	VOLTAGE RATING	D		LEAD .
3CS301B104K	0.1	100VDC	.312	13/16	#22
SCS301B105K	1.0	100VDC	. 562	1 5/16	#20
SCS301B405K	4.0	10000	.750	2 1/16	#20
SC\$301C473K	0.047	200VDC	400	13/16	#20
SCS301C334K	0.33	200VDC	.562	1 9/16	#20
SC\$301C105K	1.0	120C./DC	.750	2 1/16	#20

DIMENSIONS OF METALLIZED POLYSULFONE CAPACITORS

Figure 4

The combination of thin organic plastic film dielectric with metallized electrodes provided the maximum volumetric efficiency. Added to this was the 125°C operating capability and the superior electrical properties inherent in polycarbonate film. Established reliability of the subminiature metallized polycarbonate capacitor as a consequence of this Production Engineering Measure completed the requirements that are of particular importance to the designer of reliable electronic equipment where space is at a premium.

These same considerations, as they applied to Polysulfone film, plus the potential of polysulfone film as a result of the film's superior high temperature characteristics promised increased reliability of metallized film capacitors.

As previously stated, this Production Engineering Measure encompasses two distinctly different dielectric film materials, namely Metallized Polycarbonate and Metallized Polysulfone.

Starting with Paragraph 3.3, Section 3 has been divided into two parts: Part 1 covers the Metallized Polycarbonate Capacitors and Part 2 covers the Metallized Polys Vone Capacitors.

PART 1

THE METALLIZED POLYCARBONATE FILM CAPACITOR

3.3 Process Improvement Phase 1

The conditions or processes evaluated are as follows:

- (a) Quality of Metallized Polycarbonate Film as received
- (b) Shrinkage of film
- (c) Heat treatment of capacitor section
- (d) Removal of entrapped solvent
- (e) Burn-in.

3.3.1 Film Manufacture and Source

At the inception of this Production Engineering Measure there was one domestic supplier of thin gauge capacitor grade metallized polycarbonate film. Our first objective was to obtain a suitable source with the expertise to improve film quality so that the contract objective of low failure rate metallized polycarbonate capacitors was feasible. Film quality was dictated by the state-of-the-art and the capability of the domestic manufacturer.

Three dielectric film manufacturers were engaged to supply material for Phase 1 of the contract. They were designated as follows:

Source A Domestic

Source B Foreign

Source C Domestic

The film supplied by Source A was manufactured by the extrusion process. This process consists of forcing molten plastic through a die. The major limitations of this process when considering ultra-thin films for use as capacitor dielectrics are variations in thickness, the probability of holes and thin spots, and the inclusion of polymer gels and particulate matter.

Source B was an established foreign manufacturer whose film would be used in the initial phases of the contract as a yardstick for comparison of quality and performance.

Domestic Source C supplied a film made by the solvent casting process similar to that manufactured by Source B. Solvent casting provided the potential for excellent gauge control and the manufacture of very thin films. The major limitation of this process was the high probability of entrapped solvent. Special consideration was given to this factor in the improvement of the capacitor manufacturing process.

3.3.2 Quality of Film as Received

A comprehensive incoming inspection was performed on both the .00025 inch and the .00050 inch gauge metallized polycarbonate films received from the three sources and intended for use in the process improvement evaluation phase of the contract. The characteristics examined were film width, margin width, film thickness and metal electrode thickness (resistance of metallization in both the transverse and machine directions). In addition, a visual inspection was conducted on the general condition of the rolls including wrinkles, holes, alignment, and splices.

In thin dielectric films wrinkling can be of extreme concern since inclusion of wrinkles in the rolled section can lead to both excessive meanical and electrical stress concentrated in small areas resulting in early failure. Particular attention was given to this factor in performing the inspection of the rolls of dielectric as received. The material received from Source B and Source C was acceptable. Of the twenty-two rolls received from Source A, four rolls exhibited wrinkling. Inspection for wrinkles involved a relatively few number of turns on the outside of the rolls. It was anticipated that wrinkles were present further into a majority of the rolls from Source A that were "apparently acceptable" at incoming inspection.

An additional factor of concern was the uniformity of clear edge i.e. that portion of the dielectric film surface free of metallization

and providing adequate isolation of the adjacent electrodes when concentrically wound and depicted in Figure 1 as Margin. One roll of material from Source A exhibited a margin width below the acceptable tolerance of ±1/64 inch. One roll of material from Source B exhibited a margin wider than the acceptable tolerance which was not considered to be a major discrepancy since quality and performance would not be impaired.

Metallization or metal electrode thickness was important in terms of ultimate parameter performance and life characteristics of the capacitors. Thin metallization results in high resistivity expressed in ohms per square with typically an increase in DF due to I R losses. In addition, the leads which are attached by a metal end spray process to the ends of the capacitor sections bonding to the metallization, make a high resistance termination with a consequent increase in DF and the possibility of open circuit due to loss of adhesion to the metallization. However, metallization that is too thick will result in a section which will not clear properly under excess stress or the necessary fault clearing during processing resulting in a short circuited device or severe degradation in insulation resistance. Metal electrode thickness was found to be acceptable for the material from all three sources. However, the 1.75 inch wide film supplied by Source A exhibited marginally thick metallization in the transverse direction, an indication of possible short and IR problems with capacitor sections made from this material.

Film thickness and tolerances are important both in terms of ultimate capacitor performance and in yield. Thin gauge film could affect the film dielectric strength, electrical performance of the capacitor, and reliability. Gauge variations and thick film could cause losses due to capacitance tolerance and physical size rejects. Four of the rolls of film supplied by Source A exhibited heavy gauge while two other rolls showed a variation in gauge in the transverse direction.

The metallized polycarbonate film from suppliers B and C was satisfactory. That supplied by Source A (the extruded film) was found to have both major and minor discrepancies. Tables III and IV present the results of the incoming inspection performed on material supplied by Sources A and B respectively.

It was necessary to develop a process for manufacture of capacitors from these films which eliminated or corrected those capacitors with intrinsic defects inherent in the metallized films.

The necessary sequence in this situation was development of a sacisfactory section design, process, and finished component burn-in.

3.3.3 Film Shrinkage

A common effect of the manufacture of thin continuous polymeric films has been the introduction of mechanical stress, or orientation, primarily in the machine direction but sometimes also in

TABLE III

A CONTRACTOR OF THE CONTRACTOR

-

INCOMING INSPECTION OF METALLIZED POLYCARBONATE FROM DOMESTIC SOURCE A

						Metallization Thickness	Thickness	
	Nominal	Roll		Actual Measur	easurements of	in ohms per square	r square	
Material	Gauge	No.	Width(in) Margi	n(in)	Thickness(mil)	Machine Direction	Transverse Direction	Comments
Polycarbor	0.25	-	0.50	. 062	0.24	1.41	1.83	OK
nate Film		7	0.50	. 062	0.25	1.41	1.83	OK SK
from		٣	0.50	. 062	0.24	1.74	1.37	Wrinkles
domestic		4	0.50	. 062	0.30	1.74	1.82	Heavy Gauge
source						•		į
		2	1, 75	. 062	0.25	1.36	0.95	Š
		9	1.75	. 046	0.29-0.35	1.29	0.95	Heavy Gauge
		7	1,75	. 062	0.25	1.36	0.95	OK Y
		œ	1.75	. 062	0.25-0.28	1.71	0.89	Ga. var. *
		6	1,75	. 062	0.25	1,57	0.95	OK A
		10	1,75	. 031	0.25 - 0.27	1,43	0.83	Narrow Mar.
		11	1,75	. 062	0.26 - 0.32	2.57	1.66	Heavy Gauge
		12	1,75	. 062	0.24	1.72	1.07	O.Y.
		13	0.50	. 062	0.52	1.87	1.83	OK
		14	0.50	. 062	0.55	1,85	1,83	OK
		15	0.50	. 062	0.55 - 0.60	1,30	1.60	Heavy Gauge
		16	0.50	. 062	0.50	1.48	1.37	OK
		17	1.75	. 062	0.50	1.29	0.95	Wrinkles
		18	1,75	. 062	0.51	1,21	0.95	Wrinkles
		19	1,75	. 062	0.52-0.56	1,14	0,83	Ga. var. *
		20	1, 75	790	0,52 - 0,56	1.21	0.83	Ga. var. *
		77	1, 75	. 062	0,50	1,43	0.89	OK
		22	1, 75	. 062	0.50-0.53	1,43	0.95	Wrinkles

*Gauge Variations were in the transverse direction.

TABLE IV

INCOMING INSPECTION OF METALLIZED POLYCAKBONATE FROM FOREIGN SOURCE B

					•	Metallization	Metallization Thickness	
	Nominal Roll	Roll	Ac	Actual Messur	esurements of	in ohms per square	r square	
Material	Gauge	No.	Width(in) Margin	Margin(in)	Thickness (mil)	Machine Direction	Transverse Direction	Comments
Polycarho-	0.24	-	0.50	. 062	0.25	1,85	2.05	OK
nate Film		7	0.50	. 062	0.26	1, 19	1.37	OK
from non-							٠	
domestic		3	1, 75	. 062	0.24	1.50	1.01	OK
source		4	1,75	. 062	0.25	1,36	1,01	OK
		Ŋ	1,75	. 062	0.24	1,71	1,30	OK
- 23		9	1, 75	. 062	0.24	1.57	1.19	OK
_	c c	r	6	6 70	6	1 40	2 2 2	Ä
	0.50	_	0, 50	790.	0,54	07.1	7.70	40
		∞	0.48	. 046	0.54	2.04	2,28	OK
		6	1, 75	. 093	0.50	1.86	1, 13	Wide margin
		10	1, 75	. 062	0.49	2.14	1.36	OK
		11	1, 75	. 062	0.50	1, 43	0.95	ΟĶ
		12	1, 75	. 062	0.50	1,36	1.07	OK

the transverse direction of the film. This stress or stretch has often been purposely introduced to enhance film tensile strength or to take advantage of stress relief in the form of film shrinkage. Heating and exposure to solvents are methods that have been used to "shrink" plastic films.

Capacitance stability of a polycarbonate film capacitor as a function of time and temperature stress conditions considered normal in typical applications is achieved when the inherent shrinkage of the film occurs after the winding of the section and before finishing into a completed encased capacitor.

However film in which the shrink factor is too great or which does not readily stabilize after exposure to temperatures equivalent to the maximum operating temperature of the capacitor will result in a capacitor which does not exhibit the desired long term stability with time and temperature.

The temperature selected for evaluation of the film shrinkage was a graduated temperature exposure of one hour duration in an oven with the temperature increased from a starting level of 85°C to a maximum of 150°C in 5°C increments. Three inch lengths of the 1.75 inch wide metallized film from the three sources were suspended in an oven. Shrinkage was observed during the exposure period.

Figures 5 and 6 demonstrate in graph form the percent shrinkage as a function of temperature of the films from Sources A and B. There was no detectable shrinkage up through 135°C for either film. The extruded film from Source A exhibited significant shrinkage in both the machine and the transverse directions above 135°C. The cast film from Source B did not shrink in the transverse direction and shrunk from 2% to 2 1/2% in the machine direction.

Table V presents additional shrinkage test data comparing materials from Sources B and C. Domestic source C compared favorably with foreign Source B. The maximum shrinkage of the C material was 4.3% at 150°C. This amount of shrinkage is an acceptable level.

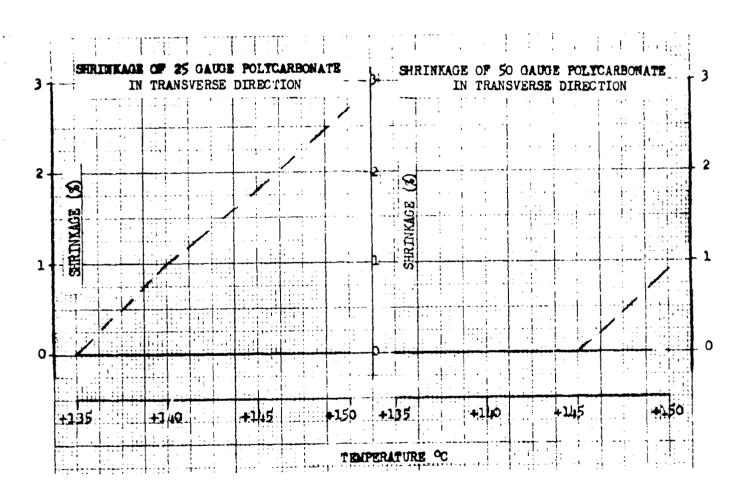
The glass transition temperature of polycarbonate occurs at about 145°C. Examination of the data indicated that film shrinkage was consistent with this characteristic by shrinking most rapidly in the 140°C to 150°C range. The results of the test indicated that Source A material (extruded film) shrunk to an undersirable extent from the standpoint of process and performance, whereas the cast film from Source C was acceptable.

The stress present in the machine direction of the film was relieved by an effective heat treatment developed by a matrix of rapacitor sections and temperature exposures. The resultant treatment was incorporated as

Figure 5

SHRINKAGE OF METALLIZED POLYCARBONATE

IN TRANSVERSE DIRECTION



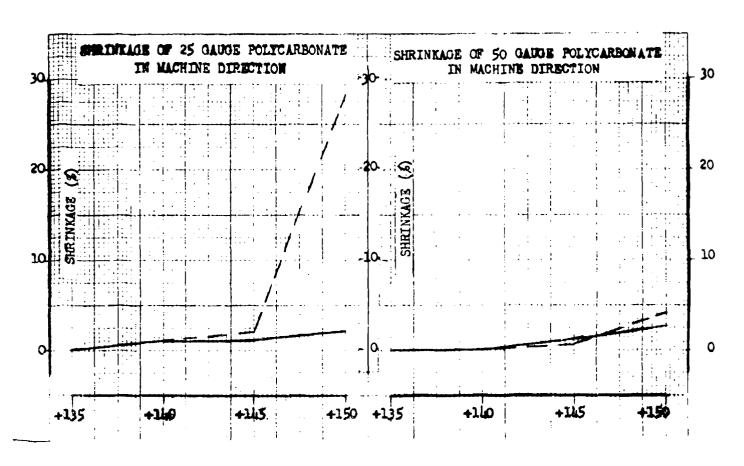
DOMESTIC SOURCE A: _______

FOREIGN SOURCE B: ______

Figure 6

SHRINKAGE OF METALLIZED POLYCARBONATE

IN MACHINE DIRECTION



DOMESTIC SOURCE A: ______

 $\label{table v} \textbf{SHRINKAGE OF METALLIZED POLYCARBONATE FILM}$

Temp. (°C)	24 Gauge B Material	24 Gauge C Material	50 Gauge B Material	50 Gauge C Material
+125°C	NIL	NIL	NIL	1.1%
+130°C	0.5%	1.1%	0.5%	1.1%
+135°C	0.5%	1.1%	0.5%	1.1%
+140°C	1.1%	2.1%	1.1%	2.1%
+145°C	1.1%	2.1%	2.1%	3.2%
+150°C	2.1%	2.1%	3.2%	4.3%

Note 1: Shrinkage in machine direction determined by change in length of 3" strip after one hour at specified temperature.

Note 2: B Material - Source B C Material - Source C a requirement into the manufacturing process resulting in a capacitor with the desired stable characteristics. It was equally important to assure that the selected heat treatment did not damage either the metal continuity or the dielectric comprising the metallized polycarbonate film.

3.3.4 Section Winding

A total of 2000 metallized capacitor sections were required for the Process Evaluation phase of the contract. The breakdown of ratings, quantities, and material sources is presented in Table VI.

Sections were prepared by winding the metallized polycarbonate film on a small diameter mandrel to form a roll. During
the winding, proper alignment and tension were maintained to ensure
a capacitor section having necessary mechanical and electrical attributes.
The number of turns, mandrel diameter, thickness of film, and winding
tension control both the active area and diameter of the section. The
width of film selected was that required to produce a finished section
of the nominal capacitance required. The cut ends were secured to
the roll with plastic tape and the section removed from the mandrel.

The capacitor sections were inspected for conformance of physical dimensions, margin variations, overall workmanship and capacitance. During the winding operations, wrinkles were encountered with the 0.50 inch wide film from Source A. Portions of the rolls were

TABLE VI
SECTION REQUIREMENTS FOR PROCESS EVALUATION

Part No.	Capacitance and Voltage Kating	Material Source	Number of Sections
SCS-301B104K	0.1^ μF -100 VDC	Α	200
		В	100
		С	200
SCS-301B405K	4.0 μF - 100 VDC	А	200
		В	100
		С	200
SCS-301C473K	0.047µF - 200 VDC	A	200
		В	100
		С	200
SCS-301C105K	1.0 µF - 200 VDC	Α	200
		В	100
		С	200

so badly wrinkled as to render them unusable and much of the material had to be discarded. The section yield for Source A material was down to less than 50% as a consequence of the wrinkling. No significant problems were encountered during the winding of sections from material supplied by Sources B and C.

Provisions for wrinkle inspection were added as a part of the Incoming Acceptance criteria established which controlled this problem.

3.3.5 Heat Treatment of Sections

Polycarbonate film can contain trace quantities of residuals such as umpolymerized monomer, low molecular weight polymer, reaction by-products, degradation products, solvent, and absorbed moisture.

Not only can these materials affect characteristics such as insulation resistance at both 25°C and the high operating ambient, in this case, 125°C, but they can contribute to accelerating end-of-life of an hermetically sealed capacitor. It is important to optimize capacitor quality and performance by removing these contaminants.

An effective section heat treatment could remove the entrapped solvent and undesirable residuals and condition the capacitor section for mechanical and electrical stability by causing stress relief or shrinkage. Of those capacitor sections wound for evaluation and Test Phases 1 and 2, 1280 sections were required to perform the test matrix to determine the most effective heat treatment. Thirty-

two capacitor sections of Material Source A of each rating listed in Table VI plus sixteen sections each of Material Sources B and C of each rating per Table VI, were subjected to each of the following five heat treatments.

(a) Group 1 (256 sections): Heat for 2 hours at 150°C

(b) Group 2 (256 sections): Heat for 4 hours at 150°C

(c) Group 3 (256 sections): Heat for 20 hours at 125°C

(d) Group 4 (256 sections): Heat for 18 hours at 125°C and a vacuum of less than 250 microns

(e) Group 5 (256 sections): Heat for 24 hours at 85°C followed by 12 hours at 100°C followed by

12 hours at 125°C.

Section testing after heat treatment consisted of dielectric strength, capacitance, dissipation factor, and insulation resistance at 25°C. The test conditions and limits were as follows:

Dielectric Strength: 2x rated voltage

Capacitance: ±10% of nominal

Dissipation Factor: 0.30% maximum

Insulation Resistance: 500,000 megohms or

100,000 megohms x mfd minimum.

The 4.0 mfd - 100 V sections made with material from domestic Source A and exposed to the Groups 1 and 2 heat treatments exhibited excessive shrinkage and failed the 25°C section dielectric strength test at 200 VDC. This result was consistent with the high film

shrinkage noted for the Source A material at 150°C in Section 3.3.3.

Further evaluation of these two groups was discontinued. Therefore,

Groups 1 and 2 are not listed in Table VII.

There were no rejects in those sections made from foreign Source B material or from domestic Source C material. Of the 384 sections remaining from the domestic Source A parts, 93 sections or 24% had low insulation resistance. The results tabulated in Table VII demonstrated that the incidence of low insulation resistance tended to increase with increasing size and that no significant differences were as yet evident as a function of Heat Treatment.

Additional sections were heat treated to replace the electrical rejects reported in Table VII.

3.3.6 Heat Aging

An investigation was made of the effects of a long-term section heat conditioning or "Heat Aging" on the capacitance stability and general performance of the metallized polycarbonate capacitor.

One half of the sections made from Source A and Source B material and heat treated per section 3.3.5 were aged for 144 hours at 125°C.

Capacitance was recorded at 24 hour intervals and results were plotted in Figures 7 through 12.

The average capacitance of the various lots aged exhibited small changes. A determination of the effectiveness of the Heat Aging

TABLE VII

EFFECT OF HEAT TREATMENT ON ELECTRICAL PERFORMANCE

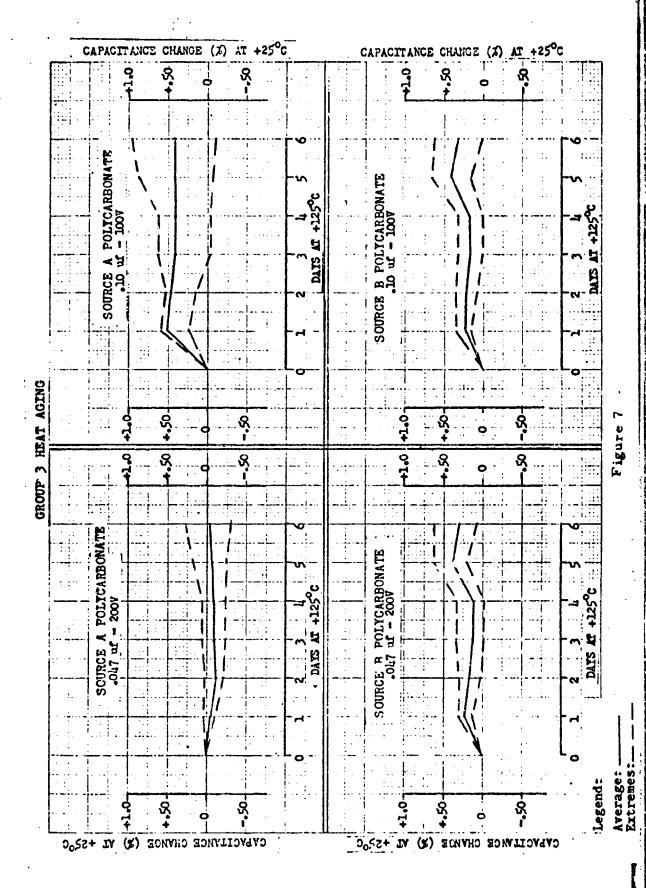
MATERIAL: METALLIZED POLYCARLONATE SUPPLIER: DOMESTIC SOURCE A

Heat Treatment	Section Rating	No. Units Tested	No. Insulation Resistion Rejects
Group 3	0.047 mfd - 200 V	32	0
	0.10 mfd - 100 V	32	4
	1.0 mfd - 200V	32	8
	4.0 mfd - 100 V	32	21
Group 4	0.047 mfd - 200 V	32	0
	0.10 mfd - 100 V	32	3
	1.0 mfd - 200 V	32	3
	4.0 mfd - 100V	32	20
Group 5	0.047 mfd - 200 V	32	0
	0.10 mfd - 100 V	32	10
	1.0 mfd - 200 V	32	8
	4.0 mfd - 100 V	32	16

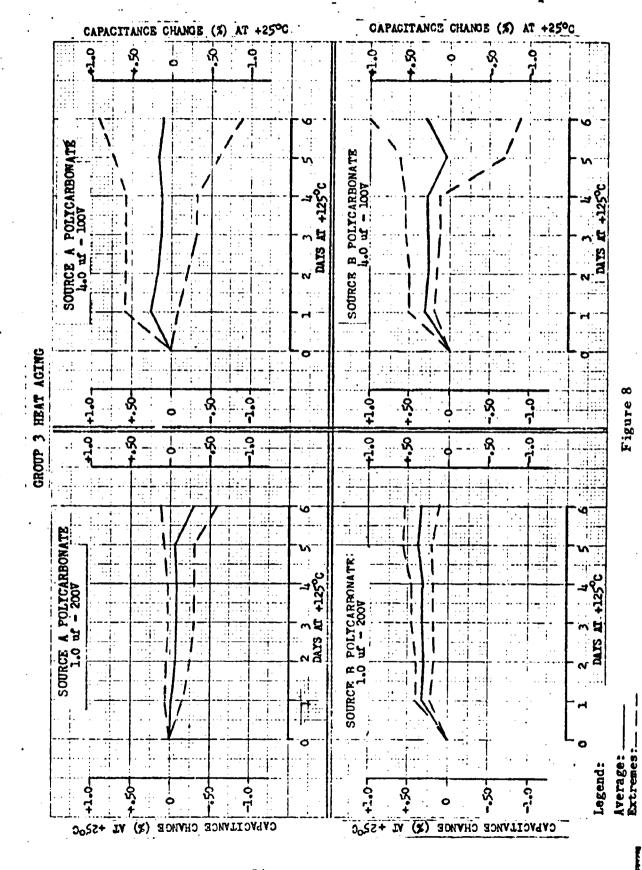
HEAT AGING

Q

METALLIZED POLYCARBONATE CAPACITORS



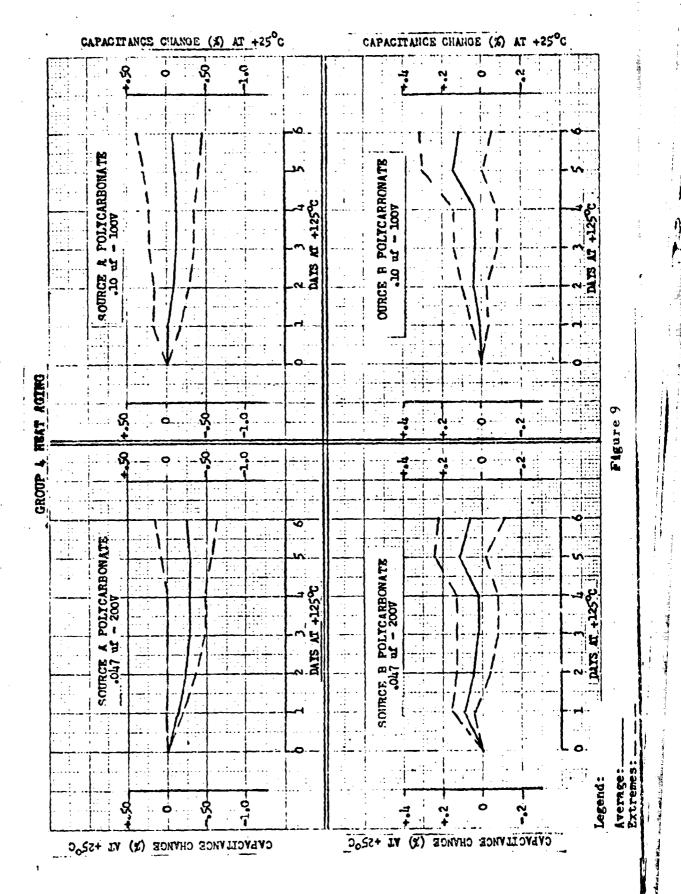
METALLIZED POLICARBONATE CAPACITORS



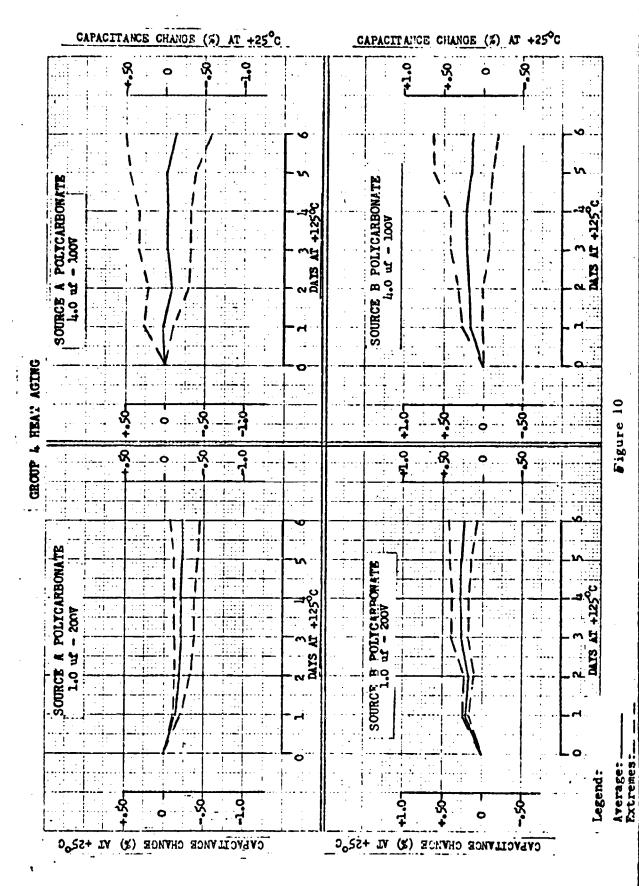
, HEAT AGING

6

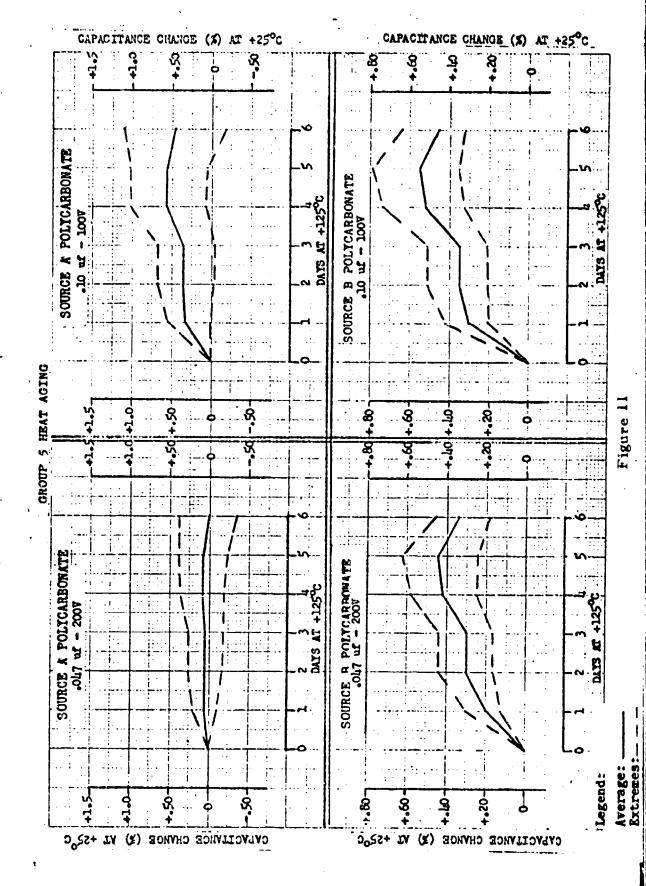
METALLIZED POLYCARBONATE CAPACITORS



METALLIZED POLYCARBONATE CAPACITORS



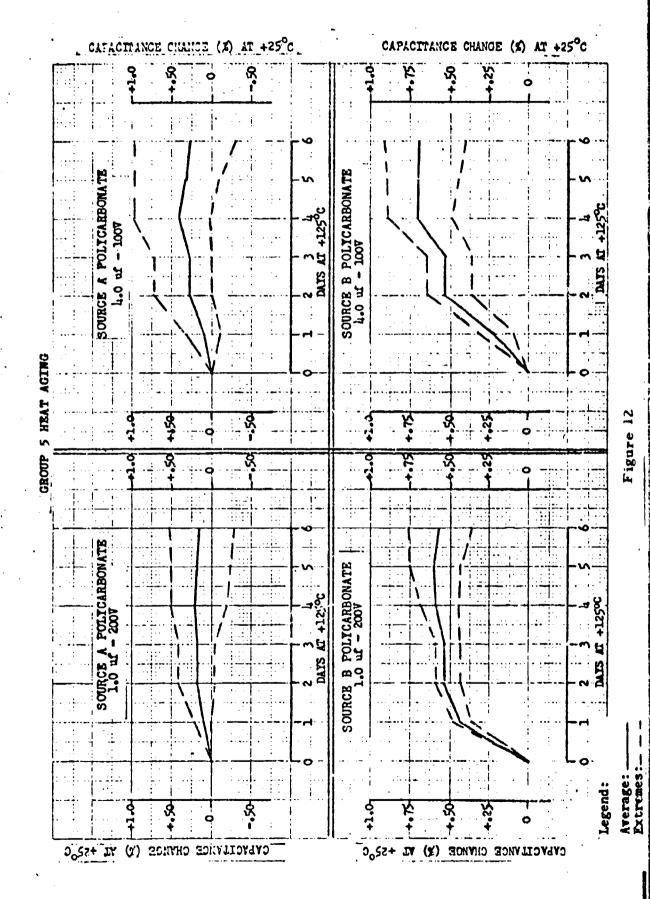
METALLIZED POLYCARBONATE CAPACITORS



, HEAT AGING

O.

METALLIZED POLYCARBONATE CAPACITORS



could not be made at this time but was made at the conclusion of the Phase 1 electrical testing.

The capacitor sections that did not receive the Heat Aging were identified as Subgroup A and those that were aged were identified as Subgroup B.

3.3.7 Assembly

All of the capacitor sections that had received the heat treatment and subsequent electrical section test were completely assembled.

Polycarbonate film is quite susceptable to contamination from a wide variety of materials including the natural excretions from the skin. Precautions were taken during all of the steps comprising the assembly operation to assure that the metallized polycarbonate sections were not subjected to contamination from external sources.

Metal solder was applied to the electrode ends of the capacitor section after which lead wires were attached. The next step in the assembly operation consisted of applying plastic insulating end caps to each end of the capacitor section. The capacitor section was then inserted into an electro-tinned brass tube. A compression glass header was threaded over the lead wire at each end of the capacitor section and was soldered to the case. The eyelet of one of the two

compression glass headers was solder sealed. The next step in the operation consisted of filling the voids inside the assembly with a potting resin through the single remaining open eyelet. The function of this potting resin was to provide shock and vibration resistance consistent with the requirements of MIL-C-39022. The one remaining open eyelet was solder sealed thus completing the operation. The entire lot of capacitors was given a 100% visual inspection and a seal test.

3.3.8 Production Burn-In

It is common practice for the manufacturer of high quality components to subject established reliability parts to a production burn-in, or voltage conditioning, and to incorporate this screening procedure as an integral portion of his process. It was especially important to the success of this Production Engineering Measure to include an effective burn-in to insure attainment of the failure rate objective.

The test capacitors were first subjected to pre burn-in dielectric strength test and electrical measurements. The dielectric breakdown rejects were removed and the remainder of the capacitors were split into two equal groups. One group was given a burn-in consisting of the application of rated voltage for 250 hours at 125°C.

The second group was subjected to 140% of rated voltage for 250 hours at 125°C.

The criteria used to determine a failure were the require ments of MIL-C-39022 and SCS-301 Amendment 1 as follows:

Dielectric Strength:

2x rated voltage

Capacitance Tolerance: ±10%

Dissipation Factor:

0.30% maximum

Insulation Resistance:

 25° C, 10^{5} megohms x mfds or 5×10^{5} megohms minimum

125°C, 10^3 megohms x mfds or 2×10^3 megohms minimum.

The results of the pre and post burn-in electrical measurements are broken down in Table VIII into both Heat Treatment and Material Source categories. These results are dramatic evidence of the inadequacy of the domestic Source A material whereas both Source B and Source C gave indications of being of sufficient quality to achieve the contract objective. The performance of the Source C capacitors was so consistent that a choice of Heat Treatment was not yet possible. Table IX presents the 125°C insulation resistance after burn-in.

Table X presents the Source A and Source B capacitor burn-in test results as a function of Heat Aging. It was concluded that the extended heat conditioning produced no discernable effects on capacitor performance and should not be made a part of the manufacturing process.

TABLE VIII

PHASE 1 BURN-IN ELECTRICAL RESULTS

Heat Treatment	Material Source	No. Units Tested	Pre Burn-In Failures	Burn-In Failures	Post Burn-In Failures	125°C IR Failures	Yield
1	A	Not T	ested ·	<i></i>		• • • • •	
	В	32	0	0	0	0	100
	С	64	0	0	3	0	95
2	A	Not T	ested				
	В	32	0	0	0	0	100
	С	64	0	0	4	1	94
3	A	128	4	2	75	23	19
	В	64	0	0	1	1	97
	C	64	1	0	2	2	92
4	A	128	7	4	67	23	21
	В	64	0	0	0	5	92
	С	64	0	0	6	1	89
5	A	128	4	3	69	29	18
	E	64	0	0	1	1	94
	С	64	O	0	1	0	98

TABLE IX

PHASE 1 125°C INSULATION RESISTANCE AFTER BURN-IN

Rating	Material Source A	Material Source B	Material Source C
0.047 mfd - 200 V	12 Failures	0 Failures	0 Failures
0,10 mfd - 100 V	12 Failures	0 Failures	l Failure
1.0 mfd - 200 V	17 Failures	7 Failures	3 Failures
4.0 mfd - 100 V	32 Failures	l Failure	0 Failures

PHASE 1 EFFECT OF HEAT AGING ON BURN-IN OF METALLIZED POLYCARBONATE CAPACITOKS

Sub Group A: No Heat Aged Sub Group B: Heat Aged

	Sub Gr	oup A	Sub G	roup B
Failure Mode*	Source A	Source B	Source A	Source B
Dielectric Strength	39 Failures	0 Failures	45 Failures	0 Failures
Capacitance Tolerance	33 Failures	l Failure	28 Failures	2 Failures
Insulation Resistance				
25°C	45 Failures	2 Failures	39 Failures	3 Failures
125°C	42 Failures	6 Failures	33 Failures	4 Failures
Total Failures	159	9	145	9

^{*}After 250 hour production burn-in at 125°C and at rated or accelerated voltage levels.

3.4 Phase 2 - Test and Evaluation of Process Improvements

3.4.1 Group A and B Inspection

All capacitors, including all non-catastrophic rejects, were subjected to Group A inspection in conformance with MIL-C-39022 as modified by SCS-301 Amendment 1. The capacitors were grouped together by capacitance rating and material source to simplify testing and reporting. At the conclusion of the Group A testing, all rejects were removed from the evaluation lots and the lots were put through the Group B Tests.

Tables XI, XII, XIII and XIV list in detail the results of the quality conformance inspection. Table XII is the Source B control for the Source A parts listed in Table XI. Table XIV is the Source B control for the Source C parts listed in Table XIII.

A summary of the inspection tests are presented in

Table XV as a function of Heat Treatment and Material Source. The

following conclusions were drawn:

Due to the catastrophic failures, poor quality and low yield with Source A material the attainment of the .001% 1000 hour failure rate was not realistic or economically feasible using Source A material.

Since there were no catastrophic failures and most of the parametric failures occurred before Group B testing, the use of Source C material afforded an excellent opportunity for achieving the contract reliability objective.

]

	1, R. S.	REMARKS												
8	A A A	Amount Rejected	Number N/A	0	0	0	18	Q	0	s Number 0		0	0	0
Page 1 of	Lot Identification Groups Lot Size Material Source Inspection (Subgroups A and	Amount Tested	Sample size Acceptance Number	93	93	93	33	æ	93	Sample size Acceptance Number		13	13	13
	conformance	Inspection Conditions or Limits		5 cycles	Mo leakage	400 VDC	500,000 regolms min.	0517 uf .0423 uf	: •3%					
	modified by SCS-301 results of quality	Test Paragraph		4.6.2	4.6.3	4.6.4	4.6.7	4.6.5	. it. 6.6		4.6.1	4.6.1	4.6.1	4.6.1
•	1.200 BB	Requirement Paragraph	· .	3.5	3.6	3.7	3.10	3.8	3.9	AQL = 1.0%	3.3	3.4	3.23	3.24
	Report No. 1200-8-1018R-000 Contract No. DAABO5-67-C-2707 Customer Part Number STS, 2010LA34 Applicable Specification MII-C-35022 Amendment2	Test	Group A, Subgroup I 100 percent inspection	Temperature cycling	Scal	Dielectric withstanding	Insulation resistance 25°C	Capacitance	Dissipation factor	Group A, Subgroup 2 Inspection level	Visual and medianical Examination (external)	Physical dimensions		Workmanship.

. i

第 3 第 3 第

EVALUATION TESTING OF SOURCE A DOMESTIC METALLIZED POLYCARBONATE GROUP A AND B TEST

				Page 2 of	3		
Report No. 1200-8-1020R-0CD	707	. •		Lot Identifica	Identification Groups 3, b,		
Customer Part Number SCS-301B104K Applicable Specification M11-C-30022	104K	as modified by SCS-301	-301	Lot Size Material	Source A		
Ar	Amendment 2 Summarized results	성	quality conformance i	inspection (Sub	(Subgroups A and B)		
Test	Requirement Paragraph	Test Paragraph	Inspection Conditions or Limits	Amount	Amount Rejected	REMARKS	
Group A, Subgroup I 100 percent inspection		·		Sample size Acceptance Number	Number N/A		
Tempera we eveling	3.5	4.6.2	5 cycles	8	0		
Scal	3.6	4.6.3	No leakage	26	0		
Dielectric withstanding	3.7	4.6.4	200 VDC	25	5		
Insulation resistance 25°C	3.10	4.6.7	500,000 E3 200,000	87	22		
Capacitance	3.8	4.6.5	:.090 uf	87	4	-	
Dissipation factor	3.9	9.9.4	:.3%	87	0	-	
Group A, Subgroup 2 Inspoction level	AQL = 1.0\$			Sample size Acceptance Number	s Number 0		, income Minerallik kraliske (d. 1845)
Visual and mechanical Examination (external)	3.3	4.6.1				•	nggan pendagan sa yayi - pinindaka gan
Physical dimensions	3.4	1.6.1		13	0		********
	3.23	4.6.1	•	13	0		******
Worksanship.	3.24	.4.6.1		13	0		
				we is not an entire to the	the section of the se	and the file of the second sec	100 P

Rapart No. 1200-8-10228-000				Page 3 of		
Number	as	modified by SCS-301 results of quality	conformance	Lot identified Lot Size Material Lot Size Inspection (Su	Lot Size of Subgroups A and B)	4, & 5
Test	Requirement Paragraph	Test Paragraph	Inspection Conditions or Limits	Amount Tested	Amount Rejected	REMARKS
Group A, Subgroup I 100 percent inspection				Sample size Acceptance Number	se 84 Number 11/A	
Temperature cycling	. 3.5	4.6.2	5 cycles	48	0	
Scal	3.6	4.6.3	No leakage	1 8	0	
Dielectric withstanding	3.7	4.6.4	400 VDC	48	111	
Insulation resistance 25°C	3.10	4.6.7	100,000 min.	O ⁺ I	18	
Capacitance	3.8	4.6.5	1.36 ₩	Ot _l	0	
Dissipation factor	3.9	4.6.6	±.•3\$	О [†]	0	
Group A, Subgroup 2 Inspection level	AQL = 1.0\$			Sample size Acceptance Number	Number 0	
Visual and mechanical Examination (external)	3.3	4.6.1				
Flysical dimensions	3.4	4.6.1		13	0	
Marking '	3.23	4.6.1		13	0	
Workmenship	3.24	4.6.1		13		
			<u> </u>		X	

EVALUATION TESTING OF SQURCE A DOMESTIC METALLIZED POLYCARBONATE GROUP A AND B TEST

Report No. 100-8-102:R-000 Contract No. pharos-67-6-2707 Customer Part Number Sys-3010:0522 Applicable SpecificationMil-6-39022 Amendment 2 Summar			conformance	Fage 4 of 3 Lot Identification Groups 3 Lot Size 50 Material 50 inspection (Subgroups A and B)	tion Groups 3, 4, 500 Ecours A and B)	1, & 5
i Test	Requirement Paragraph	Test Paragraph	Inspection Conditions or Limits	Amount Tested	Amount Rejected	REMARKS
Group A, Subgroup I 100 parcant inspection	•			Sample size Acceptance Number	Number N/A	
Temperature cycling	3.5	ट . 9.म	5 cycles	66	, o	
Soal	3.6	4.6.3	No leakage	8	0	
Dielectric withstanding	3.7	4,6,4	200 VDC	8	20	
Insulation resistance 25°C	_	4.6.7	25,000 merohms min	70	26	
Capacitanco		4.6.5	3.88 ut	70	27	
Dissipation factor	3.9	9.9.4	3%	70	0	
Group A, Subgroup 2 Inspection level	AQL = 1.0%	1		Sample size Acceptanco Number	20 13 3 Number 0	
Visual and mechanical Examination (external)	3.3.	4.6.1		·		
Physical dimensions	3.4	4.6.1		13	0	
. Hurking	3.23	τ.6.μ		13	0	
Worksanship	3.24	4.6.1		વ	0	
	THE PROPERTY OF THE PROPERTY OF THE	大学の大学のでは、これでは、日本のでは、日本のでは、	entre des services de la composition della compo	of the annual contract wenterfolds and	The second secon	

-51-

{ i

EVALUATION TESTING OF SOURCE A DOMESTIC METALLIZED POLYCARBONATE GROUP A AND B TEST

2. 4. 2. 5.	REMARKS		Continued Test				•	
Page 5 of 8 Lot Identification Groups 3. 4 Lot Size Material Source A ection (Subgroups A and B)	Amount Rejected	9 76 Number N/A	ឌ	0	0	m	0	. 000
insp	Amount Tested	Sample Size Acceptance Number	92	76	76	76	76	76 76
2010473K Mil-C-39022 as modified by 808-301 Amendment 2 Summarized results of quality conformance	Inspection Conditions or Limits		2,000 Megobas Min.	250 VDC	. 250 Hours	167,000 Megodma,Min.	#10%.of Initial Value	68 .33\$
modified by SCS-301	Test Paragraph	·	4.6.7	4.6.8	4.6.18	4.6.7	4.6.5	At +125°C, 24 - 48 hrs. 202 - 250 hrs. a* +25°C
C473K -C-39022 as mondment 2 Summarized	Requirement Paragraph		3.10	3.11	3.21	3.21	3.21	3.21
Report No. 1200-9-29R-000 Contract No. DAABO5-67-C-2707 Customer Part Number SCS-301C473K Applicable Specification M11-C-39022 Amendment 2 Summa	Test	Group B:	Insulation resistance (at high ambient)	Flashover	14fe at +125° C Volts 280 VDC	Insulation resistance at 25°C after high terperature lifo test	Capacitonco after high terperaturo life test	Dissipation factor after high temperature life test

THE PROPERTY OF THE PROPERTY O

Report No. 1200-9-2118-000 Contract No. DAABO5-67-C-2707 Custoner Part Number SCS-1018104K Applicable Specification M11-C-19022 Amendment Z	39 E	diffed by BCS-301 results of qualit	CS-301 quality conformance	fnsp	Page 6 of 8 Lot Identification Groups 3, 64 Material Eource A ection (Subgroups A and 3)	3, 4, & 5 A	
Test	Requirement Paragraph	Test Paragraph	Inspection Conditions or Limits	Amount	Amount Rejected	REMARKS	
Group B:		·		Sample Size Acceptance	Sample Size 64 Acceptance Number M/A		
Insulation resistance (at high ambient)	3.10	1.6.7	2,000 Megobms Mn.	₹5	ឌ	Continued Test	1
Flashover	3.11	4.6.8	125 VDC	75	0	•	
11fe at +125° C Volts 140 VDC	3.21	4.6.18	250 Bours	₫	~		
Insulation rosistance at 25°C after high temperature life test	3.21	t.6.4	167,000 Megohms Min.	63	2		
Capacitanco after high temper at uro lifo test	3.21	5.9.4	±10% of Initial Value	63	0	•	
Dissipation factor after high temperature life test	3.21	At +125°C, 24 - 48 hrs 202 - 250 hrs at +25°C	3	જ ્	000		
							-48

Report No. 120C-9-213R-000 Contract No. DAABO5-67-C-2707 Customer Part Number SCS-301C105K Applicable Specification Mil-C-39022 Grandment S	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	as modified by 8CS-301	diffed by BCS-301	fnsp	ation Groups 22 Source Source	13. 14. 18. 5. A.
Test	Requirement Paragraph	Test Paragraph	Inspection Conditions or Limits	Amount Tested	Amount Rejected	RELARKS
Group B:				Sample 512e Acceptance	Sample Size 22 Acceptance Numbor N/A	
Insulation resistance (at high ambient)	3.10	4.6.7	2,000 Megchms Min.	8	17	Continued Test
Flashover	3.11	4.6.8	250 VDC	22	0	
Life at +125° C Volts 280 VDC	3.21	. 8.9.4	250 Hours	81	0	·
Insulation resistance at 25°C after high temporature life test	3.21	4.6.7	33,300 Magobans Man	81	T	•
Capacitance after high temperature life test	3.21	4.6.5	±10% of Initial Value	প্ত	0	•
Dissipation factor after high temperature life test	3.21	At +125°C, 24 - 48 hrs 202 - 250 hrs at +25°C	.64 .33 \$35	સ સ સ	000	

3, 4, & 5	REMARKS		Continued Test		-	•		•
Page 8 of 8 Lot Identification Groups 3, 4, Lot Size 41 Material Source A ection (Subgroups A and B)	l § t	so humber 143	35	0	m	4	. #	000
Page 8 Lot Identi Lot Size Material Inspection (Sul	Amount Tested	Sample Size Acceptance Number	14	11	£4	9	Q	0 0 0 7 7
Page 8 of 8 Lot Identification Lot Size Material quality conformance inspection (Subgroups	Inspection Conditions or Limits		250 Megobms Min.	125 VDC	250 Hours	8,350 Vegohms Min.	110% of Initial Value	. 676 . 676 . 33.4
و ج	Test Paragraph	:	4.6.7	4.6.8	4.6.18	4.6.7	4.6.5	At +125°C 24 - 48 hrs. 202 - 250 hrs. at +25°C
022 ummax	Requirement Paragraph		3.10	3.11	3.21	3.21	3.21	3.21
Report No. 1200-9-215R-000 Contract No. DAAB05-67-C-2707 Custoner Part Number <u>SCS-301B405K</u> Applicable Specification <u>M11-C-39072</u>	Tes	Group B:	Insulation resistance (at high ambient)	Flashover	Life at +125° C Volts 140 VEC	Insulation resistance at 25°C after high temperature life test	Capscitunce after high temperature life test	Dissipation factor after high temperature life test

I	•			Page 1 of	8	
Report No. 1200-9-1109R-000 Contract No. 194805-67-0-2707 Customer Part Number Sts-3010473K Applicable Specification Hil-C-34022	173K -39022 38 ent 2 Surmarized	modified by SCS-301 results of quality conformance	301 tv conformance	Lot Identification Lot Size Material	ation Groups 1 and 16 Source B	and 2
Test	1	Test Paragraph	Inspection Conditions or Limits	Amount	Amount Rejected	REMARKS
Group A, Subgroup I 100 percent inspection				Sample size Acceptance Number	69 16 Number N/A	
Temperature cycling	3.5	4.6.2	5 cycles	16	. 0	
Scal	3.6	4.6.3	No leakage	16	0	
Dielectric withstanding	3.7	4.6.4	400 VDC	٧.	0	
Insulation resistance 25°C	3.10	t.6.7	Soc. 000 Karchma Min	, 10	0	
Capacitance	3.8	4.6.5	0517 ur	16	0	
Dissipation factor	3.9	4.6.6	:.3 %	16	c	
Group A, Subgroup 2 Inspection level	AQL = 1.0\$	į		Sample size Acceptance Number	Number 0	
Visual and mechanical Examination (external)	3.3	4.6.1		·		
Physical dimensions	3.4	4.6.1		13	0	
<u>thrking</u>	3.23	4.6.1		13	0	
Workmanship	3.24	4.6.1		13	O	
			¥	,		

	•			Page 2 of	8	
Report No. 1200-9-1111R-000 Contract Nr. DAABO5-67-C-2707 Customer Part Number SSS-301B104K Applicable Specification M11-C-3907	25 m	modified by SCS-301	-301	Lot Identification Lot Size Material	tion Groups 1 and 2 16 Source B	nd 2
Test	1 .	Test Paragraph	Inspection Conditions or Limits	Amount	Amount Rejected	REMARKS
Group A, Subgroup I 100 percent inspection				Sample size Acceptance Number	0 16 Number N/A	
Temperature eyeling	3.5	4.6.2	5 cycles	16	0	
	3.6	4.6.3	No leakage	91	0	
Dielectric withstanding	3.7	4.6.4	200 VDC	16	0	
Insulation resistance 25°C		4.6.7	Nerohms Min	16	O	
Capacitance		4.6.5	= 110 uf - 090 uf	16	O	•
Dissipation factor	3.9	9.9.4	=.3%	16	0	
Group A, Subgroup 2 Inspection level	AQL = 1.0%			Sample size Acceptance Number	Number 0	
Visual and mechanical Examination (external)	3.3	4.6.1				
Prysical dimensions	3.4	4.6.1		13	0	٠
Marking	3.23	4.6.1	•	13	0	
Workmanship	3.24	1.6.4		13	0	

METALLIZED POLYCARBONATE CROUP A AND B TEST EVALUATION TESTING OF SOURCE B FOREIGN

	U
	Ŀ
	AND A TES
:	-
	α
ï	_
ı	C
;	5
!	~
	Þ
	_
	٩
1	^
	E
	-
•	C
•	$\bar{\sim}$
	:
	C
)	۲.
ŀ	μ
	٢
1	4
)	9
	۶
•	۲
	α
	VED DOINGARDNATE CROILD A
	۵
ŀ	,
ì	V
	>
•	۲
	7
	×
	μ
	^
•	۲
	ı
1	٨
	-
	_
1	_
	_
	-1
ı	-
ı	TALIT

				Page 3 of	8	
Report No. 1200-9-1113R-000 Contract No. DAABSS-67-C-2707 Customer Part Number SSS-3010	2707 3010105K			Lot ldentification Lot Size	ation Groups 1 and 16	nd 2
nor	128d	modified by SCS-301 results of quality	conformance	Material inspection	Source B	
TESI	Requirement Paragraph			Amount Testod	Amount Rejected	REMARKS
Group A, Subgroup I 100 percent inspection				Samplo size Acceptance Number	26 15 Number 11/A	
Temporature cycling	3.5	4.6.2	5 cycles	16	. 0	
Log	3.6	4.6.3	No leakage	16	0	
Dielectric withstanding	3.7	4.6.4	400 VDC	16	0	
Insulation resistance 25°C	3.10	4.6.7	100,000 Kagohma Min	16	a	
Capacitance	3.8	9	册 65:1	16	0	
Dissipation factor	3.9	4.6.6	z •3%	16	0	
Group A, Subgroup 2 Inspection level	AQL = 1.0%			Sample size Acceptance Number	ze 13 s Number Ó	
Visual and mechanical Examination (external)	3.3	4.6.1				
Physical dimensions	3.4	4.6.1		13	0	
Marking	3.23	4.6.1		13	0	
Workmanehin	3.24	4.6.1		13	0	

i

Spocification Mil-C-39022 as modification Mil-C-3902 as modification for a second f		Report No. 1200-9-11115R-000 Contract No. DAAPOS-67-G-2707 Customer Part Number SCS-201	P1051C			Rage 4 of 8 Lot Identification Lot Size	Croups 1	and 2
Test		Applicable Specification Mi.	- 1	odified by SCS- esults of quali	conformance	inspection	Source B.	
Group A, Subgroup I 100 porcont inspection 3.5 4.6.2 5 cycles 16 0 Temperature cycling 3.5 4.6.2 5 cycles 16 0 Son 100 4.6.3 10 16 0 Dissipation resistance 25°C 3.10 4.6.7 25,000 16 0 Dissipation factor 3.8 4.6.5 3.40 16 0 Oroup A, Subgroup 2 AQL = 1.0\$ 50mple size Acceptance Numbor Inspection level 3.3 4.6.1 50mple size Visual and mechanical 3.3 4.6.1 3.3 4.6.1 Examination (external) 3.2 4.6.1 13 0 Expiring 3.22 4.6.1 13 0 Morecantile 3.24 4.6.1 13 0		TEST	Roquirement Paragraph	Tect Paragraph	Inspection Conditions or Limits	Amount Testod	Amount Rojected	RELARKS
Temperature cycling 3.5 4.6.2 5 cycles Sold	L	Group A, Subgroup I				Samplo siz Acceptance	Number	
3.6 4.6.3 No leakage 1.6.4 200 VDC 1.5.405	يين	1	3.5	4.6.2		16	0	
5°C 3.10 4.6.4 200 VDC 25,000 Signary Min 3.9 4.6.5 2.3\$	<u> </u>	. Seal	3.6	4.6.3	No leakage	16	0	
resistance 25°C 3.10 4.6.7 125,000 factor 3.9 4.6.5 1270 uf factor 3.9 4.6.6 5.3% bgroup 2 AQL = 1.0% rechanical 3.3 4.6.1 rechanical 3.2 4.6.1 a.24 4.6.1		Dielectric withstanding	3.7	ή•9•ή	200 VDC	16	0	
factor 3.8 4.6.5 11.9 uf factor 3.9 4.6.6 2.3\$ level 1.0\$ techanical 3.3 4.6.1 mensions 3.2 4.6.1 3.24 4.6.1	L	Insulation resistance 25°C	3.10	4.6.7	Erchma Min	76	O	
factor 3.9 4.6.6 1.3% bgroup 2 AQL = 1.0% Lechanical 3.3 4.6.1 and a 4.6.1	1		3.8	4.6.5	14. 140 ut 3.60 ut	16	O	
Dgroup 2 AQL = 1.0% level Lechanical (external) 3.3 4.6.1 mensions 3.22 4.6.1	لـــا	Disstration factor	3.9	4.6.6	2 • 3 £	16	0	
techanical 3.3 4.6.1 (external) 3.3 4.6.1 nensions 3.4 4.6.1 13 3.23 4.6.1 13 3.24 4.6.1 13	····	Group A, Subgroup 2 Inspection level				Samole si: Acceptance	20 13 3 Number O	
mensions 3.23 4.6.1 13 3.23 4.6.1 13 3.24 4.6.1 13	I	Visual and mechanical Examination (external)	3.3	4.6.1				
3.22 4.6.1 13	ييا		3.4	4.6.1		13	0	
3.24 4.6.1	ــــا	י זחנאירנין	3.23	1.6.4		13	0	
	L	Workmanship	3.24	4.6.1		13	0	

				Page 2	of B	•
Custoner Part Number SCS-3	1 1.1		-	Lot Size	Lot Identification Groups 1 and Lot Size	1 and 2
Applicable Specification MIL-C-30022 Amendment Summa	L-C-30022 Q. m. endment 2 Summarized	Almodified by SCS-301 ized results of qualit	MIL-C-30022 armodified by SCS-301 Amendment 2 Amendment 2 Amendment 2 Amendment 2 Amendment 2 Amendment 3 Amendmen	Material inspection	Sourc	e B
Test	Requirement Paragraph	Test Paragraph	Inspection Conditions or Limits	Amount Tested	Amount Rejected	REMARKS
Group B:				Sample Sige Acceptance	Sample Sige 16 Acceptance Numbor N/A	
Insulation resistance (at high ambient)	3,10	7.9.4	2,000 Megohms Min	16	0	Continued Test
Flashover	3.11	4.6.8	250 VDC	16	0	
Life at +125° C Volts 280 VDC	3.27	4.6.18	250 hou rs	91	0	-
Insulation resistance at 25°C after high temperature life tost	3.21	4.6.7	167,000 Negobms Min	16	o	
Capscitance after high temperature life test	3.21	4.6.5	110% of Initial Value	16	o	
Dissipation factor after high temperature life test	3.21	At +125°C 24 - 48 hrs 202 - 250 hrs at +25°C	.64 Mex .67 Mex .334 Mex	91 92 91	00 0	

الجواداف التحاليا والأوامواء والمواجعة والماجهان المالية المالك والمواجعة

Report No. 91-9-325R-000 Contract No. DAAPO5-67-C-2707 Customer Part Number SCS-301R104K Applicable Specification M11-C-39022 Amendment Summary TEST Requirements	Amendment Summarized Requirement Paragraph	As modified by SCS-301 ized results of qualit nent Test C	NETHELIZED FOLICARDONALE GROUP A AND B LEST PROPERTY OF THE CAST PROPERTY OF THE CAST PROPERTY OF THE CONDITIONS OF THE	Page 6 Lot Identi Lot Size Material Amount Tested	Page 6 of 8 Lot Identification Group 1 and 2 Lot Size 16 Material Source B ection cunt Amount REMA	1 and 2 B REMARKS
Group B:				Sample Size Acceptance	Sample Size 16 Acceptance Numbor 11/A	N N
Insulation resistance (at high ambient)	3.10	4.6.7	2,000 Megohms Min	16	0	Continued Test
Flashover	3.11	4.6.8	प्रकृष्ण इ	16	0	
Life at +125° C Volts 140 VDC	.3.21	4.6.18	250 hours	16	0	
Insulation rosistance at 25°C after high temperature life test	3.21	4.6.7	167,000 Megohms Min	16	0	
Capacitance after high temperature life test	3.21	4.6.5	\$10% of Initial Value	16	0	
Dissipation factor after high temperature lifo test	3.21	At +125°C 24 - 48 brs. 202 - 250 brs At +25°C	.6% Nex. .6% Nex. .33% Nex.	16 16	000	•
			•	-	And the second s	The second of th

Renort, No. 01-0-2058-000				200	9	
specification	9022 at 2 wm.ari	as modified by 3CS-301 zed results of quality	Lot Id Scs-301 Aueri	Lot Identi Lot Size Material Laspection	Lot Identification Group 1 and Lot Size Material Source B ection	1 and 2
Test	Requirement Paragraph	Test Paragraph	Inspection Conditions or Limits	Amount Tested	Amount Rejected	REMARKS
Group B:				Sample Size Acceptance Number	28 16 16 16 1A	
Insulation resistance (at high ambient)	3.10	4.6.7	1,000 Megohms Min.	16	7	Continued Test
Flashover	3.11	4.6.8	250 VDC	16	0	
Life at +125° C Volts 280 VDC	. 3.21	4.6.18	250 hours	97	0	
Insulation resistance at 25°C after high temperature life test	3.21	4.6.7	33,300 Megchms Min.	97	0	
Capacitance after high temperature life test	3.21	· 6.5	110% of Initial Value	31	0	
Dissipation factor after high temperature lifo test	3.21	At +125°C 24 - 48 hrs 202 - 250 hrs At +25°C	.6% Pax .6% Pax .33% Pax	16 16 16	000	

Report No. 91-9-325R-000 Contract No. DAAPO5-67-C-2707 Customer Part Numbor SCS-301PLOSK Applicable Specification M11-C-30	OSK -30022 ment 2 Summar	As modified by SCS-301 lzed results of quality	Page	Page 8 of 8 Lot Identification Lot Size Material Inspection	of 8 fication Group 1 of 16 Source B	1 and Z
Test	Requircment Paragraph	Test Paragraph	Inspection Conditions or Limits	Amount Tested	Amount Rejected	REMARKS
Group B:				Sample Sige Acceptance Numbor	.2e 16 Numbor N/A	
Insulation resistance (at high arbient)	3.10	7.9.4	250 Megohms Min	16	1	ຍ
Flashovor	3.11	4.6.8	125 VDC	16	0	
Life at +125° C	3.21	4.6.18	250 hours	316	0	
Insulation rosistance at 25°C after high temperature life test	3.21	4.6.7	8,350 Megodans Min.	16	1	
Capicitanco after high temperaturo lifo test	3.21	4.6.5	±10% of Initial Value	91	0	•
U ssipation factor after high temperature life test	3,21	At +125°C 24-48 hrs 202 - 250 hrs At +25°C	.64 Mex. .64 Max. .334 Max.	16 16 16	000	

TABLE AUI

Fage 1 of 8 Lot Identification Groups 1, 2, 3, 4, & 5 Lot Size Material Source C sults of quality conformance inspection	Inspection Amount Amount Redected REMARKS (graph Limits	Sample size 80 Acceptance Number N/A	2 5 cycles 80 0	3 No leakage 80 0	η 1400 VDC 80 0	Negch.	5 = 0517 uf 80 0	2.3%	Sample size 13 Acceptance Number 0	4	1 13 0		
Page Lot Lot Mate		Sample Accept	88	8	80	8	B B	80	Sample		13	13	
301 ty conformance	Inspection Conditions or Limits	·		No leakage	400 VDC	Yeachma Mn.		=•3%					
as modified by SCS-301	Test Paragraph		4.6.2	4.6.3	4.6.4	4.6.7	4.6.5	9.9.4	•	4.6.1	4.6.1	4.6.1	
ા કાસ	Requirement Paragraph		3.5	3.6	3.7	3.10	3.8	3.9	AU. = 1.0%	3.3	3.4	3.23	
Report No. 1200-9-11.08R-000 Contract No. DAAE05-67-C-2707 Customer Part Number SCS-301C473K Applicable Specification M11-C-39022 Amendment 2	TEST	Group A, Subgroup I 100 percent inspection	Temperature cycling	Scal	Dielectric withstanding	Insulation resistance 25°C	Capacitance	Dissipation factor	Group A, Subgroup 2 Inspection level	Visual and mochanical Examination (external)	Prysical dimensions	Marking .	

.

.

[:

				** ***		-
	•			Page 2 of	8	•
Report No. 1200-9-1110R-000 Contract No. DAAB05-67-C-2707 Customer Part Number 875-1018104K Applicable Specification Hill-C-39022	104K -39022	es modified by 908-301	301	Lot Identification Lot Size Material	Groups 1,	2, 3, 4, 45
TEST	Surnarized r Requirement Paragraph	results of quali Test Paragraph	quality conformance Inspection Conditions or Limits	inspection Amount Testod	Amount Rejected	REMARKS
Group A, Subgroup I 100 percent inspection,				Sample size Acceptance Number	26 79 Number N/A	
Temperature cycling	3.5	4.6.2	5 cycles	79	0	٠
Scal	3.6	4.6.3	No leakage	61	0	
Dielectric withstanding	3.7	т 6. t	200 VDC	79	0	
Insulation resistance 25°C		. 2.9.4	Sco, coo	79	ď	
Capacitance		4.7.5	. 110 ut	79	G	
Dissipation factor	3.9	4.6.6	≍•3¢	79	0	
Group A, Subgroup & Inspection level	AQL = 1.0\$	·		Sample size Acceptance Number	ze 13 s Number 0	
Visual and mechanical Examination (external)	3,3	4.6.1		·		
Physical dimensions	3.4	4.6.1		13	0	
Marking	3.23	4.6.1		13	0	
Worknanship	3.24	4.6.1		13	0	
		· · · · · · · · · · · · · · · · · · ·				

	•			Page 3 of	8	
Report No. 1200-9-11128-000 Contract No. DAABO5-67-C-2707 Customer Part Number SCS-301C105K Applicable Specification 1411-0-30022	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	- Be modified by 8CS-301 deresults of quality conformance	onformance	Lot Identific Lot Size Material Inspection	Identification Groups 1 2 3 Size 80 srial Source C	2, 3, 4, & 5.
Test	Requirement Paragraph	Tect Paragraph	Inspection Conditions or Limits	Amount	Amount Rejected	REMARKS
Group A, Subgroup I 100 percent inspection		·		Sample size Acceptance Number	80 80 Number 11/A	
Temperature cycling	3.5	4.6.2	5 cycles	80	, c	
Scal	3.6	4.6.3	No leakage	80	0	
Dielectric Withstanding	3.7	ተ •6.4	400 VDC	80	0	
Insulation resistance 25°C	3.10	4.6.7	100,000 Marchas Ma	8	n	
Capacitance	3.8	•	.1.10 uf so uf	Bo	o	
Jissipation factor	3.9	4.6.6	.3%	80	0	
Group A, Subgroup 2 Inspection level	AQL = 1.05			Sample size Acceptance Number	se Number 0	
Visual and mechanical Examination (external)	3.3	1.6.4		·		•
Physical dimensions	3.4	4.6.1		13	0	•
Marking	3.23	4.6.1		13	0	
Workmanship	3.24	1.6.1		13	0	

:

J

™ 3 3

	٠	3		Page 4 of	8	
Report No. 1200-9-1114R-000	O				•	
Contract No. DAA305-67-C-2707	707			Lot Identifica	Identification Groups 1, 2,	20 30 40 65
S lo	10	as modified by SCS-301	301	Material	Source C	
7	Summerized result	S of	quality conformance	inspaction		
Test	Requirement Paragraph	Test Paragraph	Inspection Conditions or Limits	Amount Tested	Anount Rojected	REMARKS
Group A, Subgroup I				Sample size Acceptance Number	29 80 8 Number N/A	
,				t .		
Temporature eyeling	3.5	4.6.2	5 cycles	30	0	
Scal	3.6	7.6.3	No leakage	80	0	
Dielectric withstanding	3.7	4.9.4	200 VDC	80	0	
Insulation resistance 25°C	3,10	4.6.7	25,000 Nefolma Min.	Во	5	
Capacitance	3.8	4.6.5	3.60 ur	გი	O	
Dissipation factor	3.9	9.9.4	z=39/	80	0	
Group A, Subgroup 2 Inspection level	AQL = 1.05	I		Sample size Acceptance Number	26 13 3 Number 0	
Visual and mechanical Examination (external)	3.3	4.6.1			·	
Paysical dimensions	3.4	4.6.1		13	0	
	3.23	4.6.1		13	0	
"ior cranshitp	45.4 S	T.9.4	Section 1.	13		the second secon

8 1, 2, 3, 4, &5	REMARKS	80 N/A	Continued Test				·	
Page 5 of 8 Lot Identification Groups 1, Lot Size 80 Material Source C	Amount Rejected	Number	O	0	0	1	0	000
fns p	Amount Tested	Sample Size Acceptance	89	80	8	88	&	සිසිසි
rs-301 quality conformance	Inspection Conditions or Limits		2,000 Megohma Min.	250 VDC	250 bours	167,000 Megohma Min.	110% of Initial Value	66 67 33 456
AS modified by SCS-301	Tast Paragraph		7.6.4	4.6.8	4.6.18	4.6.7	4.6.5	At +125°C 24 - 48 hrs. 202 - 250 hrs. et +25°C
022 t 2 unitat	Requirement Paragraph		3.10	3.11	.3.21	3.21	3.21	3,21
Ropert No. 91-9-325R-000 Contract No. <u>DAAROS-67-C-2707</u> Customer Part Number <u>255-3010473K</u> Applicable Specification <u>M11-C-39022</u> Amendment 2	Test	Group B:	Insulation resistance (at high ambient)	Flashover	Life at +125° C Volts 280 VDC	Insulation resistance at 25°C after high temperature life test	Capacitanco after high temperature life test	Dissipation factor after high temperature life test

ì

				Page 6	or 8	
Report No. 91-9-325R-000 Contract No. DAAMUS-67-C.2707 Customer Part Number SCS-301B104K Applicable Specification M11-C-39022 Amendment R	5-301B104K 1-6-39022 as me	- - modified by SCS-301 d results of qualit	NO LOT LOT LOT LOT LOT LOT IN SCS-301 Material M	Lot Identi Lot Size Material	Lot Identification Groups 1, 2, 3, 4, Lot Size 79 Material Source C ection	1, 2, 3, 4, 85
Test	Requirement Paragraph	Test Paragraph	Inspection Conditions or Limits	Amount Tested	Amount Rejected	REMARKS
Group Bs			•	Sample Size Acceptance	Sample Size 79 Acceptance Number M/A	
Insulation resistance (at high ambient)	3.10	7.9.4	2,000 Megobas Min.	79	1	Continued Test
Flashover	3.11	4.6.8	125 VDC	79	0	
Life at 4125° C	3.21	4.6.18	250 hours	61	0	
Insulation rosistance at 25°C after high temperature life test	3.21	4.6.7	167,000 Megohms Min.	79	æ	
Capacitonco after Migh temperature Jáfa test	3.21	4.6.5	±10% of Initial Value	79	a ·	
Dissipation factor after nigh temperature life test	3.81	At +125°C 24 - 48 hrs 202 - 250 hrs at +25°C	.64 .64 .334	79 79 79	000	

	į
ST	
i H	
В	
$\overline{}$	
Z	
¥	
<u>,</u>	
3	
E E	
Š	
R	
AKI	
S	
LIZED FOLYCARBONATE GROUP A ANI	
7	
Ę	
되 기	
1	
IALL	
그 리	
3	

AND THE PROPERTY OF THE PROPER				Page 7	of 8	
Keport No. 91-9-3258-000 Contract No. <u>DAARQS-67-C-2707</u> Customer Part Number <u>STS-301C105K</u> Applicable Specification M11-C-33022 as me Amendment 2	2707 S-301C105K 1-C-39022 88 m endment 2	odiffied by S results of	Lot Id ES-301 Quality conformance inspection	Lot Ident Lot Size Material Inspection	Lot Identification Croups 1, 2, 3, 4, Lot Size 69 Material Source C	1, 2, 3, 4, 25
Test	Requirement Paragraph	fest Paragraph	Inspection Conditions or Limits	Amount Tested	Amount Rejected	REIARKS
Group B:		·		Sample Size Acceptance	Sample Size 69 Acceptance Number M/A	
Insulation resistance (at high ambient)	3.10	7.6.4	1,000 Megohms Min	69	6	Continued Test
Flashover	3.11	4.6.8	250 VDC	69	0	
Life at +125 ° C Volts 230 VEC	3.21	4.6.18	250 hours	69	0	•
Insulation resistance at 25°C after high temperature life test	. 3.21	4.6.7	33,300 Megohas Mn	69	0	
Capacitanco after high temperaturo life test	3.21	4.6.5	110% of Initial Value	69	0	•
Dissipation factor after high temperature lifa test	3.21	At +125°C 24 - 49 hrs 202 - 250 hrs at +25°C	68 68 33%	69 69	00 C	·
			;			

TABLE AIII

3, 4, 85	REMARKS		Continued Test			-		
Groups 1, 2, 75 Source C		75 n/A	Con			·		
Lot Identification Groups Lot Size Material Source ection	Amount Rejected	Sample Size Acceptance Number	0	0	٥		0	000
1nsp	Amount Tested	Sample Size Acceptance 1	75	75	75	75	75	75 75 75
ol 1ty conformance	Inspection Conditions or Limits		250 Megobms Min.	125 VDC	250 hours	8,350 Megohms Min.	±10% of Initial Value	. 64 64 33%
as modified by SCS-301	Test Paragraph		८-९-५	4.6.8	4.6.18	۲۰9۰۴	₹.6.5	At+125°C 24 - 48 hrs 202 - 250 hrs At +25°C
പ്പ	Requircment Paragraph		3.10	3.11	3.21	3.21	3.21	3.21
Report No. 91-9-325R-000 Contract No. DAATOS-67-C-2707 Customer Part Number SCS-301B405K Applicable Specification M11-C-39022 Amendment	TEST	Group B:	Insulation resistance (at high ambient)	Flashover	Life at +125° C Volts 140 VIXC	Insulation resistance at 25°C after high temperature life test	Capacitanco after high temperaturo life test	Dissipation factor after high temperature life test

The state of the s

	•			Page 1 of	8	
Report No. 1200-8-10198-000 Contract No. EntoS-67-6-2707 Customer Part Number SCS-301 Applicable Specification Mil-	77 010473K 1-0-39022A 3050312		onformence	Lot Identification Lot Size Material inspection (Subgroups	tion Groups 3, 4, 143 Source B roups A and B)	i, & 5
TESI		Toot		Amount Tested	Amount Rajocted	REMARKS
Group A, Subgroup I 100 parcent inscuction				Sample size Acceptance Number	.e humber N/A	
Tenerature excling	3.5	4.6.2	5 cycles	64	0	
	3.6	4.6.3	No leakage	84	0	
Mag googye withstanding	3.7	η.6.4	400 VDC	84	0	
2025 Bone to the contract		4.6.7	F500, C00 Reretims Min.	1,8	c	
Capettance	_	1.6.5	= 01.57 'U'	143	0	
Vissingtion factor	C .	4.6.6	== 3%	148	0	
Group A, Subgroup 2 Inspection level	40.1 = 104	•		Sample size 13 Acceptance Number	29 13 3 Numbor 0	
Visual and mechanical	3.3	1.6.1			-	-
Project dimensions	. 	4.6.1		13	0	
1	3.23	2.6.1		13	0	
discount of the second	3.24	4.6.1		13	0	
11 2 2 3 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2						

Ronart N 1000 B.				Page 2 of		
	20d	modified by SCS-301 results of quality o	conformance	Lot Identification Lot Size Material inspection	ation Groups 3, 48	4, 2, 5
TESF	1 -	est.		Amount Tested	Amount Rejected	REMARKS
Group A, Subgroup I 100 parcant inspection				Sample size Acceptance Number	.0 48 1/A	
Temporature eyeling	3.5	4.6.2	5 cycles	148	0	
Soal	3.6	4.6.3	No leakage	84	0	
Die gerrie withstanding	3.7	२ •9•म	200 VDC	48	0	
Insulation resistance 25°G	3.10	4.6.7	= 500,000 : robea Min.	11.8	c	
Capacitanco	3.8		=, 110 uf =,090 uf	81	c	-
Dissipation factor	3.9	9.9.4	=.35	148	O	
Group A, Subgroup 2 Inspection level	AQL = 1.0%			Sample size 13 Acceptance Number	o 13 Numbor o	
Visual and mechanical Examination (external)	3.3	4.6.3				
Firsteal dimensions	3.4	4.6.1		13	0	
Mirking	3.23	4.6.1	-	13	0	
Workmanchip	3.24	4.5.1		13	0	

Report No. 1200-8-1027R-000 Contract No. DAADOS-67-C-2707 Customer Part Number SCS-301C1C5K Applicable Specification N11-C-30	O22 am	[A 0]	conformance	Page 3 of 8 Lot Identification Lot Size Material Inspection (Subgroun	of 8 fication Groups 3, 4, 18 Source B Subcroups A and B)	4, 8, 5
TEST	Requirement Paragraph	Tect Paragraph	inspection Conditions or Limits	Amount Testod	Amount Rojected	REMARKS
Group is Subgroup I				Sample size Acceptance Number	θ με Number N/A	
Temporature eyeling	3.5	4.6.2	5 cycles	871	0	
. Coal	3.6	4.6.3	No leakage	84	0	
Die geerre vithstanding	3.7	4.6.4	400 VDC	84	0	
Insulation resistance 25°C	3,10	4.6.7	FICO,000 Merchas min,	भिष्ठ	C	
Capacitance	3.8	५.6.5	= 1.18 us	48	C	-
Dissipation factor	3.9	4.6.6	=.3%	48	0	•
Group A, Subgroup 2 Inspection level	AQL = 1.0%	Į		Sample size Acceptance Number	Number 0	
Visual and mechanical Examination (external)		4.6.1				-
Faysical dimensions	ή·ε.	4.6.1		13	0	
Marking	3.23	4.6.1		13	o	
Workmanship	3.24	4.6.1		13	0	

EVALUATION TESTING OF SOURCE B FOREIGN METALLIZED POLYCARBONATE GROUP A AND B TEST

	-		•	Page 4 of	8	
Report No. 1200-8-1025N-000 Contract No. DAAPOS.67-C-2707 Customer Part Number SCS-301B405K Applicable Specification Null-C-39022 Amendment 2 Summart	1 2	as modified by 3CS-301	conformance	Lot Identification Lot Size Material	Grams 3, 18 Source B	4. 8.5
Test	Requirement Paragraph	e e c		Amount Testod	Amount Rojected	REMARKS
Group A, Subgroup I 100 percent inspection	•			Samplo siza Acceptanco Number	.θ μβ Number 11/A	
Tomporature cycling	3.5	4.6.2	5 cycles	84	0	
	3.6	६.७.४	No leakage	84	0	
Die gerie withstanding	3.7	4.6.4	200 VPC	148	0	
Insulation resistance 25°C	3.16	4.6.7	= 25,000 merohas min.	μR	2	
Capacitanco	3.8	4.6.5	= 4.40 u? = 3.60 ur	48	0	-
Dissipation factor	6.5	4.6.6	=.3%	48	0	
Group A, Subgroup 2 Inspection level	AQL = 1.0%	9		Sample size Acceptance Numbor	:0 13	
Visual and mechanical Examination (external)	(•
	3.3	4.C.1				
Prysical dimensions	4.8	4.6.1	·	13	0	
Marking	3.4	4.6.1		13 .	0	
Vortranship	3.4	4.6.1		13		

- 75 -

Report No. 1200-9-210R-COO Contract No. DAABO5-67-C-2707 Custoner Part Number SCS-3015473K Applicable Specification M11-C-39022 Amendment Summer		as modified by SCS-301	diffed by SCS-301	gsuţ	Page 5 of 8 Lot Identification Groups 3 Lot Size Material Ection	3 3 4 & & 5 e B
Test	Requirement Paragraph	Test Paragraph	Inspection Conditions or Limits	Amount Tested	Amount Rejected	PEKARKS
Group Bs				Sample Sige Acceptance	Sample Size 48 Acceptance Number M/A	
Insulation resistance (at high ambient)	3.10	4.6.7	2,000 Magohns Mfr.	84	0	Continued Test
Flashover	3.11	4.6.8	250 VDC	84	0	
Life at +125° C Volts 280 VDC	3.21	4.6.18	250 bours	84	0	
Insulation rosistance at 25°C after high temperature life test	3.21	4.6.7	167,000 Megohms Min.	8ग	0	
Capacitanco after Ligh temperaturo lifo test	3.21	5.9.4	± 10% of Initial Value	8ग	0	
Sissipation factor alter figh temperature	3.21	At +125°C 24 - 48 hrs 202 - 250 hrs at +25°C	.6% Max. .6% Max. .33% Max.	81 81 81	000	•

Report No. 1200-9-212R-000 Contract No. DAAROS-67-C-2707 Custoner Part Number SCS-301B104K Applicable Specification F11-C-39	27 104K 1-39322	es modified by SCS-301	301	Page 6 of 8 Lot Identification Lot Size Material		Groups 3, 4, & 5 48 Source B
Age	ndmant Summarized	results of qual	quality conformance inspection	inspection		
Test	Requirement Paragraph	Test Paragraph	Inspection Conditions or Limits	Amount Tested	Amount Rejected	PELLARKS
Group B:				Sample Size Acceptance Numbor	20 h	V
Insulation resistance (at high ambient)	3.10	4.6.7	2,000 Megobms Min.	84	0	Continued Test
Flashovor	3.11	4.6.8	125 VDC	84	0	
Life at +125° C Volts 140 VDC	3.21	4.6.18	250 hours	8ग	0	
Insulation resistance at 25°C after high temperature life test	3.21	4.6.5	167,000 Megohas Ma.	84	0	·
Capacitanco after high temporaturo life test	3.21	4.6.5	±10% of Initial Value	84	0	
Dissipation factor after high temperature life test	3.21	At +125°C 24 - 48 hrs 202 - 250 hrs et +25°C	.6% Max. .6% Max. .33% Max.	▶ 84 84	. 000	

Tande in

Groups 3, 4, & 5 4,7 Source B	REMARKS		Continued . Test		 			
	Amount Rejected	74 k7	5	0	0	0	0	. 000
Page 7 Lot Identitot Size Material Inspection	Amount Tested	Sample 5120 Acceptance Number	Ltq	L1 .	Ьtı	Ŀη	L'n	74 74 71
SCS-301	Inspection Conditions or Limits		1,000 Megohms Min.	250 VDC	250 hours	33,300 Magohms Min.	flow of Initial Value	.6% Max. .67 Max. .33% Max.
as modified by SCS-301 red results of quality	Test Paragraph		4.6.7	4.6.7	4.6.18	1.6.7	4.6.5	At +125°C 24 - 48 brs. 202 - 250 brs. at +25°C
	Requirement Paragraph		3.10	3.11	3.21	3.21	3.21	3.21
Roport No. 1200-9-2148-000 Contract No. DAAF05-67-C-2707 Custoner Part Number SCS-301C105K Applicable Specification Hil-C-39022 Amendment E	Test	Group B:	Insulation resistance (at high ambient)	Flashover	life at +125° C Volts 280 VDC	Insulation resistance at 25°C after high terperature life west	Capacitanco after high temperaturo life test	Micolpathon factor catter high temperature life test

The same of the sa

		•	!	Page 8 of	of 18	•
Costoner Part Number Stelland	-2707 -2014 LOSK		. -	Lot Idents	Lot Identification Groups 3, h, & 5	3. 1. 6. 5
Applicable Specification 141-C-39022 as modified by SCS-301 Amendment 2 Summarized results of military	Amendment 2 Summarized	codified by SCS-results of ansi	odified by SCS-301 Naterial Source results of mality enformance increase (Subgroups & and B)	Naterial Tanes	Source B	B
Test	Requirement Paragraph		Inspection Conditions or Limits	Amount	Amount	REMARKS
Group Bs				Sample Size Acceptance N	Sample Size 46 Acceptance Numbor N/A	

Insulation resistance (at high ambient)	3.10	1.6.4	250 Megodma Min.	Ş	. .	Continued . Test
Flashovor	3.11	4.6.8	125 VDC	74	0	
7						
Volts 140 VDC	3.21	4.6.18	250 hours	911	•	
Insulation rosistance at 25°C after high terperature life test	3.21	7.9.4	8,350 Megobms Min.	91	0	
Capacitanco after high temperature		•	±10% of			
lifo test	3.21	4.6.5	Initial Value	94	0	
Dissipation factor after after		At +125°C 24 - 48 hrs	.6% Max	9 ⁴	0	•
life test	3.21	202 - 250 pro. at + 25°C		9 4	0 0	

TABLE XV

PHASE 2 SUMMARY OF CONFORMANCE INSPECTION TEST RESULTS

TT 4	34	No.	<i>c</i> .	1200010	<i>a</i>	c 1	c p ²
Heat Treatment	Material Source	Units	Failures	Failures	Group B	Gross Viald/%A	Group B
Treatment	<u>bource</u>	resteu	rallures	randres	Tailules	1 teld(70)	11614(70)
1	A	128	Not Te	sted			
	В	32	0	0	1	97	97
	С	64	3	o	6	86	90
2	Α	128	Not Te	sted			
	В	32	0	1	. 0	97	100
	С	64	4	1	3	88	95
3	A	128	7 5	23	10	16	33
	В	64	1	1	0	97	100
	С	64	2	2	0	94	100
4	A	128	67	23	5	26	87
	В	64	0	5	0	92	100
	С	64	6	1	0	89	100
5	A	128	69	29	2	22	93
	В	64	1	1	0	97	100
	С	64	1	0	0	98	100

Includes all parametric and catastrophic failures after the production burn-in except burn-in shorts.

² Includes only Group B parametric and catastrophic failures.

Because of the unsatisfactory results with Source A material it was decided to drop the 150°C heat treatments (nos. 4 and 5). A choice between the other three heat treatments could not yet be made.

The production burn-in at 140% of rated voltage and 125°C for 250 hours was selected to become an integral portion of the manufacturing process.

3.5 Phase 3 - Reevaluation of Sources and Process Improvements

The Phase 2 test results forcefully demonstrated the total inadequacy of polycarbonate film from Supplier A as a capacitor dielectric and the excellent possibility of attaining the low failure rate objective of the Production Engineering Measure with metallized polycarbonate film from Supplier C.

After careful consideration, however, it was felt that state-of-the-art improvements in film manufacture combined with capacitor manufacturing process modifications could produce a significant improvement in the quality of capacitors utilizing material supplied by domestic Source A. At the same time, verification of the good quality and performance associated with film from domestic Source C could be accomplished. It was decided to reevaluate material from Sources A and C before proceeding with First Article Test Phase of the contract.

3.5.1 Reevaluation of Material Source A

Incoming inspection of polycarbonate material

Incoming Inspection of New Source A Material

manufactured and metallized by Source A revealed excessive wrinkling and a gauge variation of as much as +22%, -12%. This gauge variation when in the transverse direction had caused some of the rolls to be soft on one edge while hard on the other edge. The material as a whole was considered to be very poor quality.

3, 5, 1, 2 Winding of Capacitor Sections - Source A Material Winding of 96 sections for another evaluation of Source A material was performed. These sections consisted of the following:

> SCS-301C105K 48 pieces 1.0µF 200 V SCS-3013405K 48 pieces 4.0µF 100 V

3, 5, 1, 3 New Process Evaluation - Source A Material

All 96 capacitor sections were subjected to the new process evaluation listed below as recommended by the manufacture of Source A material.

(a) Heat Treatment #1

Heat treated by raising the temperature under vacuum (250 microns or less) from +25°C to +125°C with a 15.6°C per hour increase for a total of 8 hours.

- (b) Voltage Test at 50 VDC and check
 capacitance and dissipation (actor at +25°C).
- (c) Assembly

 Assemble capacitors with one lead hole open.

(d) Heat Treatment #2

- Heat treat by raising the temperature under vacuum (250 microns or less) from +25°C to +125°C with a 15.6°C per hour increase for a total of 8 hours. Break vacuum to dry air and seal.
- (e) Temperature Cycle

 Temperature cycle in accordance with

 paragraph 4.6.2 of MIL-C-39022.
- (f) Seal Test

 Seal test in accordance with paragraph 4.6.3

 of MIL-C-39022.

3.5.1.4 Electrical Measurements

The capacitors constructed with new Source A material were given a dielectric strength test and were measured for capacitance, dissipation factor and insulation resistance. The conditions and limits were the same as those used throughout the contract in accordance with SCS301 Amendment 2. The results are tabulated below:

Part No.	No. Units	Dielectric Breakdowns	Insulation Resistance Failures	Yield
SCS-301C105K	48	10	20	38
SCS-301B465K	43	18	30	0

3,5,1,5 Conclusions

The quality of the new Source A material was poor and the results of the new Process Evaluation were unacceptable.

Accordingly, further evaluation of these capacitors was discontinued and metallized polycarbonate film from domestic Source A was disapproved as the dielectric for the capacitors of this contract.

3.5.2 Revaluation of Material Source C

3.5.2.1 Incoming Inspection of New Source C Material

Incoming inspection was performed on each roll of new polycarbonate material manufactured and metallized by domestic source C. The parameters inspected included gauge variation, metallization thickness, width variation and continuity of metallization. The material was acceptable.

3.5.2.2 Winding of 400 Capacitor Sections

Winding of all 400 capacitor sections for the additional process improvement evaluation was completed. The average winding loss was approximately 40% with an individual breakdown per type shown in Table XVI. It was more difficult to wind very small sections with thin gauge dielectric. As section size

TABLE XVI

PHASE 3

REEVALUATION OF SOURCE C MATERIAL SECTION LOSS AT WINDING

Part No.	No. of Sections	Material Width (Inches)	Nominal Gauge (Mils)	Winding Loss
SCS-301C473K	100	0.50	0.50	43%
SCS-301B104K	100	0.50	0.25	62%
SCS-301C105K	100	1.75	0.50	29%
SCS-301B405K	100	1.75	0,25	24%

and dielectric thickness increased, so should the yield. Table XVI demonstrated this effect of degree of difficulty on winding loss. The capacitor sections were inspected for physical dimensions, margin variation, overall workmanship, and capacitance and were found to be satisfactory.

3.5.2.3 Heat Treatment

Twenty-five (25) sections of each capacitance value were subjected to one of the following heat treatments:

- (a) Group 1 (100 units) heat treated at +125°C for 20 hours.
- (b) Group 2 (100 units) heat trated at +130°C for 12 hours.
- (c) Group 3 (100 units) heat treated at +140°C for 8 hours.
- (d) Group 4 (100 units) heat treated at +85°C for 24 hours minimum, followed by 12 hours minimum at +100°C and +125°C respectively.

The capacitor sections in all four heat treatment groups were tested for dielectric strength, capacitance, dissipation factor and insulation resistance at +25°C prior to the assembly operation. No failures were encountered,

3.5.2.4 Assembly

Assembly of the 400 capacitors for process improvement evaluation was completed.

3.5.2.5 Production Burn-In

Capacitance, dissipation factor and insulation resistance measurements were recorded at +25°C before burn-in of the 400 capacitors. The dielectric strength test was also performed prior to burn-in. No failures were encountered. The 400 capacitors were burned-in for 250 hours at +125°C with 140% of rated voltage applied. There were no catastrophic failures.

3.5.2.6 Groups A and B Inspection

After burn-in the capacitors were subjected to Group A inspection in accordance with Table XII of MIL-C-39022. The capacitors passing Group A inspection were subjected to capacitance and dissipation factor measurements at -55°C, +25°C and +125°C prior to Group B life test. Insulation resistance measurements were recorded at +125°C prior to life test. Life testing was conducted at +125°C for 250 hours with 140% of rated voltage applied. Capacitance, dissipation factor and insulation resistance were measured and recorded following life test. Capacitance change due to life test was calculated. Summary results are shown in Table XVII. A summary of pre burn-in, burn-in.

TABLE AVII

	METALLZED.		POLYCAKBONALE GROOF A AND B	Page 1 of	8	
Report No. 1200-9-876R-000 Contract No. MARO5-67-6-2707 Custair Part No. No. 568-3010R73K Applicable Specification Mil-6-30008 Amendment	2 rai	modified by SCS-301	conformance	Identii Size rial	Groums 1, 100 Source C	2, 3, & 4
TESF	Roquirement Paragraph	Test Paragraph	Inspection Conditions or Limits	Amount Tested	Amount Rejected	REZARKS
Group A, Subgroup I	•			Samplo size Acceptance Number	Number 11/A	
Tomograture cycling	3.5	4.6.2	5 cycles	100	0	
	3.6	4.6.3	No lenkage	100	0	
Diele, tric withstanding	3.7	4.6.4	lico vec	10	0	
Insulation resistance 25°G	3.10	7.9.4		100	0	
	3.8	4.6.5	In {2/2:	100	0	-
Dissipation factor	3.9	4.6.6	.3%	100	0	-
Group A, Subgroup 2 Inspection level	AQL = 1.0%	•		£amplo sizo Accoptance Nurbor	zo 13 e Nurbor o	
Visual and mechanical Examination (external)	3.3	4.6.1		· · · · · · · · · · · · · · · · · · ·		
Presical dimansions	3.4	4.6.1		13	0	•
1	3.23	T.9		13	0	·
Workenashio	3.4	1.9.4		13	0	
	**************************************	*				

TABLE XVII

	-		·	Rage 2 of	8	
Report No1200-9-878R-000 Contrac. No. DAAFDS-67-C-27072 Sustome Part Number SCS-301B104K Application Filt-C-39022	120d	modified by SCS-301 results of quality	conformance	Lot Identification Lot Size Material Inspaction	100 Grows 1, 2, 3, & 4	2, 3, & 4
rest		agr	Inspection Conditions or Limits	/mount lested	Amount Rajacted	REMARKS .
Group A, Subgroup I 100 percont inspection				Samplo size Acceptance Number	Number 11/A	
Temporature eveling	3.5	4.6.2	5 cycles	100	0	
L		4.6.3	No leakage	100	0	
	3.7	4.6.4	SOO VOG	100	0	-
Total at the rest change 25°C	-	4.6.7	500,000 merches min.	100	0	-
	-	4.6.5	. IIO uf Ogo uf	100	0	<u>.</u>
Westpation factor	3,9	466	35.	100	0	-
Group A, Subgroup 2 Inspection level		1.0%		Sample size Acceptance Number	Number 0	
Visual and mechanical Examination (external)	8.5	4.6.1			-	•
A CONTRACTOR CONTRACTOR	3.4	4.6.1		13	0	•.
1	3.23	4.6.1		13	0	
10.000 10.0000 10.000 10.000 10.000 10.000 10.000 10.000 10.000 10.000 10.000 1	3.24	4.6.1		1 13	d	
						The second secon

	METALLIZED	POLYCARBONALE GROOT	TALE GROUP	Page 3 of	8	
Report No. 1200-9-890R-040 Contract No. DAAROS-67-6-107 Customer Part Number 505-3016105K Applicable Specification 1911-6-39022	111 2	as modified by SCS-301	conformance	Lot Identification Lot Size Material Inspection	tion Groups 1, 2, 3, 100 Source C	2, 3, & 4
TEST	Requirement Paragraph	est		Amount Tested	Amount Rojected	REMARKS
Group A, Subgroup I				Sample size Acceptance Number	Number 1/A	
profit over the first of the	3.5	4.6.2	5 cycles	1:00	0	
o maria	3.6	1.6.3	No leakage	100	0	
1) Scari Withstanding	3.7	9	1,00 1700	100	0	
751 tage		14 6 7	100,000	100		Group 2
יד ארני הבי	-	4	1.10 uf 0.00 uf	100	0	
Disapoliton fector	3.9	4.6.6	.3%	100	0	
Group A, Subgroup 2 Inspection level	70T = 170V		·	Sample sizo Accoptanco Numbor	20 13 o Numbor 0	
Visual and mechanical		•				
Examination (external)	3.3	4.6.1			-	•
Pristed dimensions	3.4	4.6.1		1.5		
1	3.23	4.6.1		13	0	
	3.24	4.6.1	-	13	0	
10.000						

The second secon	•			Fage 4 of	8	
Report No. 1200-0-00028-000 Gerlizet No. 1448 3-57-0-2707 Gustomer Part Number 505-3017405K Applicable Specification Filed-30022	g. g.g.	modified by SCS-301	conformance	Lot Identification Lot Size Material Inspection	ation from 1, 2.	20 3. 18 li
Test	Roquiremen t Paragraph	Tost Paragraph	Inspection Conditions or Limits	Amount Tostod	Amount Rojouted	REYARKS
Group A, Subgroup I. JOS parcent invoction				Samplo sina Accoptiunco Mumbos	300 300 Marosr 11/4	
Towarature eyelling	3.5	7.6.2	5 cycles	100	0	
	9.0		No leakage	1.00	0	
Burbach Cake attach (2)		÷.6.4	2CO VDC	100	0	
Transfor rest thaces 25°C	3.10	F.0.4	25,500 min.	100	C	
Canacttanca		4.6.5	A LO UE	100	C	
Dissipation factor	5.0	4.6.6	3%	100	0	
Group A, Subgroup 2 Inspection lovel	AQL = JOS			Sample size Acceptanco Numbor	80 13 Number 0	
Visual and mechanical Examination (o cornal)	(A)	. 6.1				
Paroical dirensions	# ·0	6.1		13	0	
Marking	(E) (Z) (C)	7.2.4	٠	13	0	
Work and Man	3.24	й.6.1		13	0	

REEVALUATION TESTING OF SOURCE C DOMESTIC METALLIZED POLYCARBONATE GROUP A AND B TEST

***	0		i	Page 5	of 8	
Contract No. DAARD5-67-C-2707 Customer Part Number SCS-301C473K Applicable & posification Kil-C-39 Amendmon	707 1C473K 1-C-39022 as endmont 2 Summarize	odified by SCS-301	Lot Id SCS-301 Quality conformance inspection	Lot Identi Lot Size Material	Lot Identification Groups 1 Lot Size Material Source Cection	2,3,8,4
Test	Requirt Paragrapu	Test Paragraph	Inspection Conditions or Limits	Amount Tested	Anount Rejected	REMARKS
Group B:				Sample Sigo Accoptance	Sample Sigo 100 Accoptance Number 11/A	
Insulation resistance (at high exbient)	3.10	4.6.7	2,000 merobas min.	160	Ö	
F) at horox	3.11	4.6.8	250 VDC	100	O	
tisfe at <u>1125° C</u> Volts <u>280 VII </u>	3.21	4.6.18	250 hours	100	0	
Insulation rosistance at 25°C after high terperature life test	3.21	4.6.7	167,000 megohas afn.	300	O	
Capicitanco after high temperature life test	3.21	4.6.5	inf of Initial Value	100	0	
Licsipation fector after high temperature life test	3.21	At +125°C 24 - 48 brs 202- 250 brs at+25°C	.6% Nax. .6% Eax. .337 Eax.	100 100 103	· .	·
			:			:

THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER.

			Page) 	of 8	
Roport No. 1200-9-879R-000 Contract No. DAMBO5-67-6-2707 Customer Part Number SCS-3019104X Applicable Specification 111-6-350	20		-301	ent.	fication Groups 100 Source	3 1, 2, 3, 1, 1, 1, 5, C
Test	Summarized Requirement Paragraph	results of qua Test Paragraph	The Conditions or Tested Limits	inspection Amount Tested	Amo unt Rejocted	REMARKS
Group B:				Sample Sige Acceptance Number	20 105 SWmbGr 11/A	
Insulation resistance (at high ambient)	3.10	1.6.7	2,000 megohms ain.	100	N	1 each from Group 3 & h
Flashover	3.11	4.6.8	125 VDC	100	0	
Life at +125° C Volts 140 VDC	.3.21	4.6.18	250 hours	100	0	
Insulation resistance at 25°C after high temperature life test	3.21	ù.6.7	167,000 Nogodas ado.	100	0	
Capicitanco after high temperaturo life test	3.52	. E. Š.	110% of Initial Value	. 100	0	
Disciplifica factor after high temporature	년 한	At +125°C 24 - 48 hrs 2C2 - 250 hrs at +25°C	.6% 112x. .C% 112x. .33% 113x.	100 100 100		

Report No. 1200-9-881R-000 Contract No. DAAE05-67-C-2707 Custoner Part Number SUS-301C105K Applicable Specification Tul-J-35022 Applicable Specification Tul-J-35022 Summa	as	modified by SCS-301 results of quality	Page Lot Id SCS-301 Materi quality conformance inspection	Rage 7 of Lot Identificated Raterial Inspection	Rage 7 of 8 Lot Identification Groups 1, 99 Material Source C	1, 2, 3, & 1
Test	Requirement Paragraph	Test Paragraph	Inspection Conditions or Limits	Amount Tested	Amount Rejected	REMURKS
Group B:			·	Sample Size Acceptance Number	29 99 e Number 11/A	A
Inculation resistance (at high ambient)	3.10	4.6.7	1,000 Megohma min.	\$	0	
Flashover	3.11	4.6.8	250 VDC	66	C	
Life at +125° C Volts 280 VDC	3.21	4.6.16	250 hours	86	0	
Insulation resistance at 25°C after high temperature life test	3.21	7.9.4	33,300 :'egobms min.	86	٦	Group 2
Capacitanco after lign temperature ligo test	3.21	÷. €. 5	10% of Initial Value	%	0	·
Dissigntion factor crear Alga temperature Infertect	3.21	At125°C 24 48 hrs 202 - 250 hrs At +25°C	64 12x. 64 13x. 332 23x.	888	000	

Roport No. 1200-9-888R-000 Contract No. DAAROS-67-6-2707 Custemer Part Numbor SCS-30 Applicable Specification Mil-G-	S-202	modified by SCS-301	Page 19805K 35022 as modified by SCS-301 Materi Sumarized results of quality conformance inspection	Page 8 Lot Identi Lot Size Material Laspection	Page 8 of 8 Lot Identification Groups 1, 2, 3, 10t Size 100 Source C section	1, 2, 3, & 4
Test	Requirement Paragraph	Test Paragraph	Inspection Concitions or Limits	Amount Tested	Amount Rejected	REVERKS
Group B:			·	Sample Size Acceptance N	Sample Size 100 Acceptance Number 11/A	
Insulation resistance (at high ambient)	3.10	4.6.7	250 Fegohms min.	100	۲,	4 grass
Flachover	3.11	4.6.8	125 VDC	100	0	
life at +125° C Volts 140 VDC	3.21	4.6.18	250 hours	100	0	
Insulation resistance st 25°C after high terperature life test	3.21	4.6.7	8,325 !egohma min.	100		Group 2
Sapscitanco after high temperature life test	3.21	, 4.6.5	±16% of Initial Value	. 100	0	
Dissipation factor after high temperature life test	3.21	At +125°C 24 - 48 hrs 202 - 250 hrs. At +25°C	. 64 Nex. 64 Nex. 337 Nex.	001 001 100	000	

PHASE 3 SUMMARY OF TEST RESULTS SOURCE C MATERIAL

Heat Treatment	No. Units Tested		Group A Failures			Yield
Group 1	100	0	0	0	0	100
Group 2	100	0	1*	0	2*	97
Group 3	100	0	0	2	0	98
Group 4	100	<u>0</u>	<u>0</u>	1	<u>0</u>	99
Total	400	0	1	3	2	98.5

^{*25°}C Insulation Resistance Failures

3.6 Selection of Material Source and Process Improvements

A decision was made to use metallized polycarbonate dielectric film from domestic Source C for Phases 4 and 5. It was also decided to incorporate the 250 hour accelerated burn-in and Heat Treatment 1 as integral steps of the manufacturing process. The decisions were based on the results of testing to this point, on the current knowledge of the state-of-the-art, and on engineering judgement.

3.6.1 Material Supplier

Material from the two potential domestic suppliers of metallized polycarbonate film were each evaluated twice. The reevaluations were consistent with the original evaluations. It was demonstrated that the film from domestic Source A was of poor quality, produced economically unfeasible losses during processing and testing, and was statistically an unacceptable material for the low failure rate contract objective.

The cast metallized polycarbonate film from domestic

Source C, however, proved to be both mechanically and electrically

of excellent quality, and was the obvious choice for use in the remaining

phases of the contract.

3.6.2 Heat Treatment

Heat treatment 1 consisted of exposing the metallized polycarbonate capacitor sections to 125°C in air for 20 hours.

Examination of the electrical test results throughout
the evaluation disclosed that no one heat treatment produced
dramatically better results than the other heat treatments evaluated.
The test results associated with Heat Treatment 1 were somewhat
better than the others used in the reevaluation. This treatment
provided sufficient time and temperature to shrink and condition the
film without subjecting the material to excessive temperatures and
was selected primarily on the basis of engineering judgement.

3.6.3 Burn-In

Adoption of a production burn-in as a process step was fast becoming an accepted practice in the manufacture of high quality and high reliability components. The more rigorous accelerated burn-in was selected. It consisted of exposing the capacitors to 140% of rated voltage for 250 hours at 125°C.

3.7 Phase 4 - First Article Tests

3.7.1 Introduction

With the completion of the Evaluation and Process Improvement Phases, the First Article Test for metallized polycarbonate capacitors was undertaken. This involved the manufacture of 560 capacitors in accordance with the modified manufacturing process followed by subjecting these capacitors to the qualification inspection electrical and environmental tests as outlined in Table IX of MIL-C-39022 and modified by SCS-301 and Contract Amendments. The 560 capacitors were comprised of the following:

Material Source	<u>Type</u>	Rating	No. Units
Domestic C	SCS-301B104K	0.1 infd - 100VDC	70
	SCS-301B405K	4.0 mfd - 100 VDC	70
	SCS-301C473K	0,047 mfd - 2007DC	70
	SCS-301C105K	1.0 mfd - 200 VDC	70
Foreign B	SCS-301B104K	0.1 mfd - 100 V DC	70
	SCS-301B405K	4.0 mfd - 100 VDC	70
	SCS-301C473K	0.047 mfd - 200 VDC	70
	SCS-301C105K	1.0 mfd - 200 VDC	70

Descriptions of each of the test procedures and the test results are included in Sections 3.7.2 through 3.7.7.

3.7.2 Test Group I - 560 Units

VISUAL AND MECHANICAL EXAMINATION 4.6.1

All units were examined for type of materials, construction, physical dimensions, markings and external workmanship.

The units showed no evidence of damage and were properly marked. All dimensions were within the specified tolerances.

TEMPERATURE CYCLING 4.6.2

The capacitors were placed, from room temperature, into a chamber at -55°C +0 -3°C, and allowed to stabilize for a period of

30 minutes. They were removed from the low temperature chamber after the 30 minute period, allowed to set at room temperature for a period of time from 10 to 15 minutes, and then placed in a high temperature chamber at +125°C +3 -0°C, and allowed to stabilize for a 30 minute period. The capacitors were then removed from the high temperature chamber and allowed to set at ambient temperature for a period of time from 10 to 15 minutes. This series of transfers constituted one cycle. This cycle was repeated five times.

At the conclusion of the test, the capacitors were allowed to stabilize at 25°C. No measurements were made before or after the cycling.

No visual evidence of damage was observed.

SEAL TEST 4.6.3

The capacitors, while at room temperature, were immersed for a period of one minute in mineral oil maintained at a temperature of 125°C -0 +5°C. The capacitors were examined during and after the test for evidence of leatage of the impregnant or filling compound.

No visual evidence of leakage was observed.

DIELECTRIC WITHSTANDING VOLTAGE 4, 6, 4

A DC potential equal to 200% of rated voltage was connected from terminal to terminal for a period of one minute. This same

potential was then connected from the case to the terminals for a period of one minute. At the conclusion of this test, the capacitors were visually examined for evidence of damage.

There was no momentary or intermittent arcing or other indication of breakdown. Also, there was no visual evidence of damage at the conclusion of the test.

CAPACITANCE 4.6.5

The capacitors with values of 1.0µF and less were connected to a General Radio, Model 1608A, Impedance Bridge, operating at a frequency of 1000 Hz ± 100 Hz with a rated accuracy equal to or less than 0.05%. An external frequency of 60 Hz was applied to this same bridge for measurement of the 4.0µF capacitors.

capacitance was measured while the capacitors were at room ambient temperature.

All values were found to be within 10% of their rated nominal values.

DISSIPATION FACTOR 4.6.6

The dissipation factor of each capacitor was measured concurrently with capacitance as described in Paragraph 5.5.

All units were below the .3% maximum dissipation factor limit.

INSULATION RESISTANCE 4, 6, 7

The insulation resistance of the capacitors was measured at the rated DC voltage, utilizing a Keithley Model 610B Electrometer in conjunction with a Power Lesigns Model 2K10 Regulated Power Supply. The resistance from terminal to terminal at 25°C, the resistance from terminal to case at 25°C and the resistance from terminal to terminal at 125°C was measured. At the conclusion of the 125°C insulation resistance measurement the capacitors were removed from the temperature chamber.

All values were greater than the specified minimum requirements.

FLASHOVER 4.6.8

The capacitors were mounted, by their leads, in the test chamber and the pressure was reduced to .82 inches of mercury (equivalent to 80,000 feet). After the pressure had stabilized, a DC potential equal to 125% of the rated voltage was applied for a period of one minute between terminals and between each terminal and the case. After the conclusion of the electrical test, the pressure was returned to ambient and the capacitors were removed from the test chamber and visually examined for evidence of damage.

There was no evidence of momentary or intermittent arcing or other indication of breakdown during the tests. Also, there

was no visible evidence of damage at the conclusion of the test.

3.7.3 Test Group II - 48 Units

VIBRATION, HIGH FREQUENCY 4.6.9

The capacitors were encapsulated in a hard wax-like epoxy, the vibration transmissibility of which had previously been tested to 2000 Hz and found to be satisfactory. The capacitors were epoxied to 5" x 5" aluminum plates and the leads were supported by insulated solder terminals located approximately 1/2" from the seal end of the capacitors.

These plates were then forwarded to Continental Testing Laboratories, Inc. for vibration over the frequency range of 10-2000 Hz at an amplitude of .06" DA or 20 g/s, whichever, was the lesser. The frequency was varied at a logarithmic rate such that it took twenty minutes to traverse the frequency range of 10-2000-10 Hz.

The vibration was performed in two mutually perpendicular axes for four hours in each of the radial and axial planes for a total of eight hours. Throughout the test, a potential of 50% of the rated DC voltage was applied between the terminals of the capacitors. During the last cycle in each axis, the capacitors were monitored for any electrical discontinuities or shorts.

No opens or shorts were detected during the test.

SALT SPRAY 4.6.10

The specimens were mounted in an Associated Testing Laboratories, Model SS-3-4, Salt Spray Chamber so that the longitudinal axis was approximately at a 15° angle from the vertical and parallel to the principle direction of horizontal flow of the fog through the chamber.

The chamber was programmed to operate at a temperature of 35°C +2 -3°F. A 20% salt solution was used to generate the fog and was applied for a period of 48 hours.

At the completion of the 48 hour period, the devices were removed from the chamber, and salt deposits were removed by washing them in running water at a temperature of less than 37.8°C. After a 24 hour drying period, the capacitors were visually examined for evidence of harmful corrosion and obliteration of markings.

At least 90% of all exposed metallic surfaces were protected by the finish and the markings remained legible.

IMMERSION 4.6.11

The capacitors were immersed for a period of one hour in a saturated solution of sodium chloride and water at a temperature of 65° +5 -0°C, followed by immersion in a bath consisting of a

saturated solution of sodium chloride and water at a temperature of 0° ±3°C for a period of one hour. This cycle was repeated five times.

At least four hours, and not more than twenty-four after the completion of the final cycle, the dielectric withstanding voltage and insulation resistance of the capacitor and the capacitor to its case was measured. Capacitance and dissipation factor were also measured at 25°C. The capacitors were then examined for harmful or extensive corrosion and obliteration of markings.

No discrepancies were noted.

3.7.4 Test Group III - 48 Units

SOLDERABILITY 4.6.12

Prior to the application of flux and solder, 50% of the capacitors were subjected to aging by immersion in a noncorrosive container of boiling, distilled water for a period of one hour. No aging was performed on the remaining capacitors.

The terminals of all the capacitors were then immersed in flux conforming to type W of specification MIL-F-14256 to within 1/8" of the capacitor body, at room ambient temperature, for a period of 5 to 10 seconds. The dross and burned flux was then skimmed from the surface of the molten solder. Following this the capacitor was installed in the capacitor dip machine and dipped into the solder at the

rate of $1 \pm 1/4$ " per second, with a dwell time at the required depth of $5 \pm 1/2$ seconds and withdrawn at the rate of $1 \pm 1/4$ " per second.

After the dipping process, the capacitor lead was allowed to cool in air and the process was performed on the other lead. The residue flux was removed from the terminations by dipping in isopropyl alcohol and cleaning with a soft cloth.

After the cleaning process, the surface of each lead was examined using a microscope with a 10 power magnification, for 95% coverage of a continuous new solder coat and checked that pinholes or voids were not concentrated in one area and did not exceed 5% of the total area.

The leads were found to be covered uniformly with a smooth bright film of solder, and there was no evidence of pinholes or concentration of voids in the solder coverage.

SHOCK, MEDIUM IMPACT 4.6.13

The capacitors were encapsulated in a hard wax-like epoxy, the transmissibility of which had previously been tested and found to be satisfactory. The encapsulated capacitors were attached to 5" x 5" aluminum plates and the leads were supported by insulated solder terminals located approximately 1/2" from the seal end of the capacitors.

These plates were then forwarded to Continental Testing Laboratories, Inc. for medium impact shock. The specimens were dropped a total of 18 times, 3 blows or 3 shocks in each of the 3 axes. The peak shock value indicated was 100 g's with a pulse duration of 6 ms. During the test, a DC potential equal to 50% of the rated voltage was applied between the terminals, and a time monitor (capable of detecting transients in excess of 0.5 msec) was connected to monitor the voltage across each capacitor in order to determine any electrical failures or indication of malfunctions during the Shock Test.

Following the application of the final shock, the capacitors were removed from the shock machine and visually examined for damage.

During the Shock Test there were no opens or shorts detected.

There was no evidence of fractures or other visible mechanical damage.

TEMPERATURE CYCLING 4.6.2

The capacitors were placed, from room temperature, into a chamber at -55°C +0 -3°C, and allowed to stabilize for a period of 30 minutes. They were removed from the low temperature chamber after the 30 minute period, allowed to set at room temperature for a period of time from 10 to 15 minutes, and then placed in a high temperature

chamber at +125°C +3 -0°C, and allowed to stabilize for a 30 minute period. The capacitors were then removed from the high temperature chamber and allowed to set at ambient temperature for a period of time from 10 to 15 minutes. This series of transfers constituted one cycle. This cycle was repeated five times.

At the conclusion of the test, the capacitors were allowed to stabilize at 25°C. No measurements were made before or after the cycling.

No visual evidence of damage was observed.

MOISTURE RESISTANCE 4, 6, 14

The capacitors were mounted by their normal mounting means and installed in a horizontal position in a moisture resistance chamber.

The specimens were then conditioned for twenty-four hours at 50°C with an uncontrolled humidity and subjected to ten continuous cycles of humidity environment consisting of a 2 1/2 hour rise to 65°C and stabilization at that temperature for three hours while maintaining 90 to 98% relative humidity. The temperature was then reduced over a 2 1/2 hour period to 25°C, while maintaining 80 to 98% relative humidity, and then again increased for the next 2 1/2 hours to 65°C, while maintaining a 90 to 98% relative humidity. The temperature was maintained at 65°C for three hours, while maintaining 90 to 98% relative

humidity, and then the chamber temperature was reduced to 25°C in 2 1/2 hours while maintaining 80 to 98% relative humidity.

over a 16 hour period at the conclusion of which, the temperature was stabilized for a period of three hours. At the end of this period, the devices were subjected to a temperature of -10°C for a period of three hours. At the end of this three hour period, the devices were installed on a vibrator and vibrated for fifteen minutes at room ambient temperature with a sinewave acceleration having an amplitude of .06" DA and a frequency varying uniformly between 10 and 55 cycles per second. The frequency sweep from 10 to 55 and return to 10 cycles was traversed in approximately one minute.

During the two humidity-temperature cycles of the first six steps of all humidity cycles, a polarizing potential of 100 VDC was applied from terminal to terminal of one-half of the test samples, while no potential was applied to the remaining half.

After the final cycle, the capacitors were conditioned at 25°C -5° +10°C at a relative humidity of less than 80% for a period of between 22 and 24 hours. At this time the dielectric withstanding voltage and insulation resistance of the capacitor and the capacitor to its case was measured. Capacitance and dissipation factor were also measured at 25°C.

Concluding the electrical test, the capacitors were visually examined for evidence of extensive corrosion and obliteration of markings.

No discrepancies were noted.

3.7.5 Test Group IV - 96 Units

TERMINAL STRENGTH 4.6.15

The terminal strength test as specified in Method 211 of MIL-STD-202 was performed as follows:

Pull Test (Test Condition A) - The capacitor was clamped by one lead and a force of 4 1/2 pounds was applied to the other lead in the direction of the axes of the terminations for a period of 5 to 10 seconds.

Bend Test (Test Condition C) - The body of the capacitor was clamped in a fixture with a load of 2 1/2 pounds suspended at a point within 1/4 inch from the free end of the terminal. The body of the part was slowly inclined so as to bend the terminal through 90° and then return it to normal position with the entire action limited to one vertical plane. A bend through 90° and return to normal position is defined as one bend. Consecutive bends were in the

same direction and the load was restricted so that the bend started 3/32 ± 1/32 inch from the body of the component part. The rate of bending was approximately 3 seconds per bend in each direction.

Twist Test (Test Condition D) - The capacitor was clamped in a suitable fixture and each lead was bent to a 90° angle at a point 1/4" from the body of the capacitor, with a radius of bend approximately 1/32". The terminals were then clamped to within 3/64" ± 1/64" of the bend, and the body of the capacitor was rotated about the original axis of the bent terminals through 360° in alternating directions for three rotations at the rate of approximately five seconds per rotation.

At the conclusion of all testing, the capacitor and terminals were visually examined for signs of mechanical damage.

There was no evidence of mechanical damage, and all leads were intact at the conclusion of the test.

LOW TEMPERATURE AND CAPACITANCE CHANGE WITH TEMPERATURE 4.6.16

The capacitors were placed in a temperature chamber maintained at -55 +0 -5°C and a DC potential equal to the rated voltage

was applied at this temperature for 48 ± 4 hours. At the conclusion of this 48 hour period, the capacitance was measured at low temperature, and the units were removed from the temperature chamber and allowed to stabilize at $25^{\circ} \pm 5^{\circ}$ C where the capacitance was again measured.

The capacitors were then stabilized in a high temperature chamber at 125 ± 3 °C and the capacitance was again measured. The capacitors were returned to ambient temperature of 25° \pm 5°C, and the capacitance again measured.

The measurement of the capacitance at each of the temperatures consisted of two successive readings taken at five minute intervals to indicate that no change in capacitance had occurred.

At the conclusion of this test, the capacitors were visually examined for evidence of breakdown, areing, open and short circuiting and other visible mechanical damage.

All capacitance changes from the value at 25°C to the low and high ambient test temperature were found to be within the specified limits.

3.7.6 Test Group V - 48 Units

FAULT COUNT 4.6.17

Fault count testing was performed by Continental Testing

Laboratories, Inc. as outlined below.

The capacitors were mounted on a tubular glass fixture which, in turn, was placed inside a temperature chamber. A fault count monitoring circuit was connected to each capacitor through a current limiting resistor. The other side of the capacitor was connected to a 100 VDC or 200 VDC buss, depending upon the voltage rating of the capacitor. Temperature and high voltage were then increased to 125°C and 100 VDC and 200 VDC, respectively.

The chamber temperature, high voltage power supplies and monitoring circuits were monitored daily throughout the remainder of the test. At times during the test when a counter circuit appeared not to be counting, it was removed and the capacitor being monitored switched to a space monitoring circuit. The suspected faulty circuit was then checked and repaired, if necessary, before being returned to the test setup. This technique was used to confirm whether the capacitor was counting, or the monitoring channel malfunctioning.

Once a week throughout the test, each monitor circuit was subjected to a test pulse to insure proper operation of the circuit. The following is the procedure used for calibrating and checking both the individual monitoring circuits and the test setup as a whole.

Each monitoring circuit was equipped with a current limiting resistor which was in series with the capacitor to be monitored. The resistor's value was computed using the formula $R = \frac{0.025}{C}$, where R

was resistance in chms and C the capacitance of the test capacitor in farads. Listed below are the values for each capacitor's current limiting resistor.

Capacitance	Voltage		niting Resistor* 1/Value Calc.
. 047µF	200 VDC	560K	531K
. lµF	100 VDC	240K	250K
1.0µF	200 V DC	24K	25 K
4.0µF	100 V DC	6.7K	6.2K

*All resistors 1/2W 5%.

The individual monitoring circuits were then calibrated to insure that a 3 ms +5 V pulse at 15 pps would trigger the circuit, but a pulse 80% of the amplitude would not trigger the circuit. 5 VDC was then applied to the circuit to trigger the circuit on. The circuit was kept on until the Low IR lamp circuit had been adjusted to illuminate between 1.8 and 2 minutes after the trigger voltage had been applied. This concluded the calibration of the monitoring circuits.

Sample capacitors of the same physical size and electrical characteristics as the ones to be tested were mounted on the tubular glass fixture and connected to the monitoring circuits. The chamber temperature was increased to 125°C and stabilized. During the next four hours, the test setup was checked for proper operation. This included checking to insure that the monitor channels would detect

breakdowns and low IR values. A 1 megohm resistor was used to short each capacitor individually while observing the monitoring circuit for one count each time the capacitor was shorted. The low IR lamps were checked for operation after 1.8 to 2.0 minutes of low IR, as simulated by the 1 meg resistor shorted across the capacitor.

After a thorough check of the test setup had been completed, the chamber temperature was reduced to ambient room temperature, the high voltage DC reduced to 0 VDC and the sample capacitors removed and visually inspected. At this time, the test capacitors were placed in the chamber.

The test specifications required that after 500 hours at 125°C and rated voltage, the capacitors conform to the following requirements.

No visible evidence of damage.

Daily counts, as registered by monitoring circuit, not to exceed 4C or 1, whichever was greater, for any one capacitor.

The total number of counts was not to exceed 6C or 1, whichever was greater. C is the nominal capacitance of the capacitors.

Periods of Low IR not to exceed two minutes for any capacitor tested.

The 500 hour fault count test was completed with all parts conforming to the requirements.

3.7.7 Test Group VI

LIFE TEST 4.5.18.1

LIFE (ACCELERATED) (120 Units)

The capacitors were subjected to a 2,000 -0 to +8 hour life test at 125°C -0 +4°C with an applied DC potential equal to 140% of rated voltage.

LIFE (RATED) (200 Units)

The capacitors were subjected to a 2,000 -0 +8 hour life test at 125°C -0 +4°C with an applied DC potential equal to the rated voltage.

LIFE TEST PROCEDURES

The life test capacitors were mounted in the chamber at a distance of approximately 1 1/4" from one another to insure adequate circulation. The voltage to each capacitor was applied through an individual current-limiting resistor determined by the formula $R = \frac{0.025}{C} \text{ where C was the nominal capacitance in farads and R was in ohms not to exceed 2 megohms. The dissipation factor of each sample was measured at 125°C after 24, but not more than 48 hours from the start of the conditioning, and also at nome time during the last 48 hours of the conditioning. During these measurements, the DC voltage was removed from the capacitor terminals$

At the conclusion of the 250, 1000 and 2,000 hour test periods, the capacitors were returned to ambient temperature where capacitance, dissipation factor and insulation resistance were measured. After these measurements, the capacitors were visually examined for evidence of corrosion or mechanical damage.

All measurements were found to be within the specified limits and no visual evidence of corrosion or mechanical damage was observed.

3.7.8 Conclusions

The preproduction or First Article Tests were performed using Metallized Polycarbonate Capacitors made from material supplied by foreign Source B and domestic Source C with satisfactory results. Table XIX summarize these results which showed no failures.

With the successful performance of the First Article Tests it was concluded that domestic Source C film was equivalent to that of foreign Source B and was of sufficiently high quality to attain the contract reliability objective. Phase 5 involving the Production Run was undertaken.

3.8 Phase 5 - Production Run of Metallized Polycarbonate Capacitors

3, 8, 1 Manufacture and Burn-In

The production run was manufactured using the detailed production process developed during the Process Improvement and

TABLE XIX

PHASE 4 SUMMARY OF TEST RESULTS - FIRST ARTICLE SAMPLES SPECIFICATION MIL-C-39022

Test	Test Paragraph	Samples Tested	Failed
Group 1			
Visual and Mechanical Examination	3.23	560	0
Marking	Thru	560	0
Workmanship (external)	3.24.3	560	0
Temperature cycling	3.5	560	0
Seal	3.6	560	0
Dielectric withstanding voltage	3.7	560	0
Capacitance	3.8	560	0
Dissipation Factor	3.9	560	0
Insulation Resistance	3.10	560	0
Flashover	3.11	560	0
Group 2			
Vibration	3.12	48	0
Salt Spray	3.13	48	0
Immersion	3.14	48	0

TABLE XIX (CONT'D)

Test	Test Paragraph	Samples Tested	Failed
Group 3			
Solderability	3.15	48	0
Shock, Medium Impact	3, 16	48	0
Moisture Resistance	3.17	48	0
Group 4			
Terminal Strength	3, 18	96	0
Low Temperature and Capacitance Change with Temperature	3, 19	96	0
Group 5			
Fault Count 500 Hours	3,20	48	0
Group 6			
Life (accelerated)	3,21	320	0
Life (rated)	3,21	200	0

First Article production phases of the Production Engineering Measure. Since the manufacturing facility in which the First Article and production run was fabricated was dedicated to the production of high quality hermetically sealed capacitors, the state-of-the-art in the production areas was such that all necessary and unique production equipment had previously been developed within the company. Therefore it was not necessary to design, develop, manufacture, or procure either special tooling or design, procure, or fabricate limited production equipment in the performance of this Production Engineering Measure.

The production run of 11,550 capacitors consisted of the following listed part numbers and quantities.

Part Number	Capacitance ±10%	Voltage Rating	Quantity
SCS-301B104K	0,10	100 VDC	1925
SCS-301B105K	1.0	100 VDC	1925
SCS-301B405K	4.0	100 VDC	1925
SCS-301C473K	0.047	200 VDC	1925
SCS-301C334K	0,33	200 VDC	1925
SCS-301C105K	1.0	200 V DC	1925

Manufacture of the entire production lot of 11,350 capacitors was completed with no special problems encountered. All were subjected to the burn-in consisting of the application of 140% of rated voltage for 250 hours at 125°C. The lot satisfactorily completed burn-in.

3.8.2 Group A Tests and Preliminary Measurements

After burn-in the capacitors were subjected to the Group A tests specified in Table XII of MIL-C-39022. The entire lot met the requirements and limits of the Group A testing. See Table XX which is the applicable portion of Table XII of MIL-C-39022.

Initial capacitance of each capacitor was recorded so that a delta C value could be established for each part at the 1000 hour and 10,000 hour measurement points. With a requirement for an acceptable part for test as nominal capacitance ±10%, the test results are listed in Table XXI for each part. Initial dissipation factor measurements are recorded in Table XXII. These data include a .6% bridge and associated reading interface error in addition to the initial .3% DF limit. All parts were within limits. All parts were mounted or test racks and placed into the test ovens to be tested for 10,000 hours.

3.8.2.1 Computer Codes to Histograms

Capacities

Columns 1 and 2 - Capacity in microfarads

Column 3 - Number of units in the capacity range listed in columns 1 and 2

Computer X's - Relative display of column 3 numbers.

Delta Capacities

Columns 1 and 2 - Capacity deviation increments

Column 3 - Number of units in the increment listed in columns 1 and 2

GROUP A INSPECTION MIL-C-39022

Table XXI - Group A inspection.

Examination or test	Requirement paragraph	Method paragraph	(Percent o	ielective)1/
			Major	Miner
Subgroup 1 Temperature cycling Seal Dielectric strength Insulation resistance at 25°C Capacitance Dissipation factor	3.5 3.6 3.7 3.10 3.8 3.9	4.6.2 4.6.3 4.6.4 4.6.7 4.6.5 4.6.6	N/A 100%	inspection
Subgroup 2 Visual and mechanical examination (external) Material Physical dimensions Marking Workmanship	3.3 3.4 3.23 3.24	4.6.1	} ,	} .

Marking defects shall be as defined in MIL-STD-105.

Marking defects are based on visual examination and will be charged only for illegible, incomplete, or incorrect marking. Any subsequent electrical defects shall not be used as a basis for determining marking defects.

89 MEDIAN 0.1019		111111111111111111111111111111111111111							3	YYX	HENNELLE CONTROL OF THE PROPERTY OF THE PROPER	HERMANN TO COLUMN TO THE STATE OF THE STATE	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		TO TO TO THE TOTAL TO THE TOTAL THE				
~								3	***	***		**	C 1		X X X 4				
0.1093 # 289								7	***	********	***	*********	<	4	**************************************	****			
URS # 85 HAKEMUH 0.002A)	i					*****************	**************************************	**************************************	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	****************	**************************************			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	× × × × × × × × × × × × × × × × × × ×	r T		
0 HOI				*****	XXXXXXXXX	XXXXXXXXXXXXXXXXXXXXX	************	*************		******************		XXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX	**************	XXXXXXXXXXXXXXXXXXXXXX	*******************		*	
104K MIN ST	<u> </u>	:	₹.	Ξ.	Ŷ,	Ž.	ξ.	×	×	×	××	X,	×	×	×	×ו	××	×	×
301B 1925 017	^	.~	€	17	30	9	66	144	153	237	247	268	219	195	122	67	39	٠	√
10	COUNT 0.092	0.093	0.094	0.095	960.0	0.097	0.098	0.099	0.100	0.101	201.0	0.103	0.104	0.105	0.106	0.107	0.109	0.109	0.110
ATA	FROM TO	0.092	0.093	0.094	0.095	960.0	0.097	0.098	0.099	001.0	191.0	0.102	0.103	0.104	0.105	901.0	0.107	0.108	0.109

TABLE XXI

INITIAL CAPACITIES

																nananan karanan karana	***************************************				
•	1.0508				-				•.						xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx		***************************************	******			
	MEDIAN													******	CXXXXXXXXXXX	CKKKKKKKKKK					
	1904													YYYYY	XXXXXX	XXXXX	K. YKK		t		
	1.0994 0 1904	•											CXXXC	CXXXXXXXXXX	***********	KXXXXXXXXX	KKKKKKKKK	CKKKKKKKKK			
	B 1487 MAXINUM	926			i								XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	XXXXXXXXXX	(XXXXXXXXXXX)	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXX		
HOURS	1487	0.0										XXXXXX	CKKXXXXX	CXXXXXXXX	IXXXXXXX	CXXXXXXX	CKKKKKKK	(XXXXXXX)	XXXXXXXXXXXX		
OH 0	0.9378	EVIATION	:								×	KXXXXXXXX	KKKKKKK	KKKKKKKK	XXXXXXXXX	XXXXXXXX	KKKKKKKK	XXXXXXXX	XXXXXXXX		
~	MINIMUM 0.9378	STANDARD					×	xx.	*XXXXX	. K K K K K K	XXXXXXXXXX	***********	• XXXXXXXXXXXXXXXX	• X X X X X X X X X X X X X X X X X X X	***********	**************************************	. XXXXXXXX	************	************	****	
B1051		1.0484			0	~	-	10	52	58	39	98	162	231	338	370	290	199	113	5	
SCS-301B105K			9	0.940	0.450	0.960	0.970	0.980	0.990	1.000	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100	
)S	NU OF DATA POINTS	MEAN VALUE	FROM TO	0.930	0.940	0.950	0.963	0.970	0.980	0.990	1.000	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	
<u>ا</u> رودخخ	.		د ت	}		• . •				_ 3	i who a	et to a	æ.		<u>ج</u>	٠. ـ	٠.	J:1	-	124-	

	4.3950 0 1365 MEDIAN	The second secon			•										INGRESS STATES S	TITTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTT	HILLITES SECTION OF SE	CHARACHARACHARACHARACHARACHARACHARACHAR															
0 HOURS	2	5						×		MXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX				XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	×	~	~ ;	•	~ 1	~ .	•	***************************************		* ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '	XXXXX							
¥	: E	S12.401		×	×.	****						•				•	-			-		•	•	•	•		XXXX.	×××.	××.			×.	
B405	1925	4 68	-	•	m	2	9	16	33	46	62	77	105	135	166	180	210	181	182	E 4 .	→					22	_		•	-	-	т.	i
CS-301		COUNT	3.820	3.840	3.860	3.880	3.900	3.920	3.940	3.960	3.980	4.000	4.020	4.040	4.060	4.080	4.100	4.120	4.140	4.160	4.180	4.200	4.220	0.7.4	4.260	4.280	4.300	4.320	4.340	4.360	4.380	4.400	
) S	NO OF DATA PO	FROM TO	800	3.820	3.840	3.860	3.880	3.900	3.920	3.940	3.960	3.980	4.000	4.020	4.040	4.060	4.080	4.100	4.120	4.140	4.160	C81.4	4.200	4.220	4.240	4.260	4.280	4.300	4.320	4.340	4.360	4.380	
		3CS-301B405K 0 HOURS 01NTS 1925 NINIMIN 3.8070 8	301B405K 1925 WINIPUM 3.8070 # 484 MAXIMUM 4.3950 # 1365 MEDIAN 4.0900 4.0894 STE-LDARD DEVIATION 0.1155	301B405K 0 HOURS 1925 MINIMUM 3.8070 8 484 MAXIMUM 4.3950 8 1365 MEDIAN 4.0900 4.0894 STC.10ARD DEVIATION 0.1155 UNT 820 1	301B405K 0 HOURS 1925 WINIMUM 3.8070 # 484 MAXIMUM 4.3950 # 1365 MEDIAN 4.0900 4.0894 STC. DARD DEVIATION 0.1155 UNT 820 1 840 3 .X	301B405K 0 HOURS 1925 MINIMUM 3.8070 # 484 MAXIMUM 4.3950 # 1365 MEDIAN 4.0900 4.0894 STK.tdard Deviation 0.1155 UNT 820 1 840 3 .X 860 3 .X	301B405K 0 HOURS 1925 MINIMUM 3.8070 # 484 MAXIMUM 4.3950 # 1365 MEDIAN 4.0900 4.0894 STK.tdard Deviation 0.1155 UNI 820 1 840 3 .X 860 10 .XXXX	301B405K 0 HOURS 1925 MINIMUM 3.8070 # 464 MAXIMUM 4.3950 # 1365 MEDIAN 4.0900 4.0894 STK.tDARD DEVIATION 0.1155 4.0894 STK.tDARD DEVIATION 0.1155 820 1 840 3 .X 860 10 .XXXX 900 10 .XXXX	301B405K 0 HOURS 1925 MINIMUM 3.8070 g 484 MAXIMUM 4.3950 g 1365 MEDIAN 4.0900 4.0894 STK.:DARD DEVIATION 0.1155 4.0894 STK.:DARD DEVIATION 0.1155 820 1 840 3 .X 860 10 .XXXX 900 10 .XXXX 920 16 .XXXXX	301B405K 0 HOURS 1925 MINIMUM 3.8070 g 484 MAXIMUM 4.3950 g 1365 MEDIAN 4.0900 4.0894 STK.:DARD DEVIATION 0.1155 B20 1 840 3 .x 860 10 .xxxx 900 10 .xxxx 940 33 .xxxxxxxxxx 940 33 .xxxxxxxx	301B405K 0 HOURS 1925 MINIMUM 3.8070 8 484 MAXIMUM 4.3950 8 1365 MEDIAN 4.0900 4.0894 STK.10ARD DEVIATION 0.1155 UNT 840 3 .x 840 10 .xxxx 940 10 .xxxx 950 10 .xxxx	301B405K 0 HOURS 1925 WINIFWIN 3.8070 # 484 MAXIMUM 4.3950 # 1365 MEDIAN 4.0900 4.0894 STC.0ARD DEVIATION 0.1155 UNT 820 1 840 3 .x 860 10 .xxxx 940 10 .xxxx 950 10 .xxxx 950 10 .xxxx 950 10 .xxxxx 950 10 .xxxxx 950 10 .xxxxx 950 10 .xxxxx 950 10 .xxxxxx 950 10 .xxxxxx 950 10 .xxxxxxxxxxxxxxx 950 10 .xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	301B405K 0 HOURS 1925 WINIFWIN 3.8070 # 484 MAXIMUM 4.3950 # 1365 MEDIAN 4.0900 4.0894 STC.DARD DEVIATION 0.1155 UNT 820 1 840 3 .x 860 10 .xxxx 960 10 .xxxx 970 10 .xxxxx 970 10 .xxxxx 970 10 .xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	301B405K 0 HOURS 1925 MINIMUM 3.8070 # 484 MAXIMUM 4.3950 # 1365 MEDIAN 4.0900 4.0894 STC.4DARD DEVIATION 0.1155 UNT 820 1 840 3 .X 860 10 .XXXX 900 10 .XXXX 900 10 .XXXXX 900 10 .XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	301B405K 0 HOURS 1925 MINIMUM 3.8070 # 484 MAXIMUM 4.3950 # 1365 MEDIAN 4.0900 4.0894 STC.4DARD DEVIATION 0.1155 UNT 820 1 840 3 .X 860 10 .XXXX 920 10 .XXXX 940 3 .XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	301B405K 3.80 4.0894 STC.10ARD DEVIATION T	301B405K 0.0 4.0894 STC.40ARD DEVIATION 3.80 UNT	301B405K 0 4.0894 STA:40ARD DEVIATION 1 820 3 ** 860 3 ** 860 10 ** 880 10	301B405K 4.0894 STA:40ARD DEVIATION 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	301B405K 4.0894 STC.10ARD DEVIATION 3.80 UNT STC.10ARD DEVIATION 3.80 860 3 .X 860 10 .XXXX 960 10 .XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	301B405K 4.0894 STC.10ARD DEVIATE 860 3 .X 860 10 .XXXX 960 10 .XXXX 960 10 .XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	301B405K 4.0894 STC.10ARD DEVIATE UNT 1 STC.10ARD DEVIATE 860 3 °X 860 10 °XXXX 960 10 °XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	301B405K 3.80 4.0894 STC.10ARD DEVIATION T	301B405K 4.0894 STC.10ARD DEVIATION TO STR.10ARD	301B405K 4.0894 STC.10ARD DEVIATION TO SECOND	301B405K 4.0894 STA: 40ARD DEVIATION TO SECONDARY STANDARY SECONDARY STANDARY SECONDARY SECONDA	301B405K 4.0894 STC.10ARD DEVIATION 1820 1 STC.10ARD DEVIATION 1820 3 STC.10ARD DEVIATION 1820 10 STC.10ARD DEVIATION 1820 1820 STC.10ARD STC.120 1810 STC.120 STC.120 1810 STC.120 1810 STC.120 ST	301B405K 4.0894 STC.10ARD DEVIATE 860 3 °X 860 10 °XXXX 960 10 °XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	301B405K 4.0894 STC.10ARD DEVIATION 1925 MINIMAL 860 3	301B405K 3.80 4.0894 STK.40ARD DEVIATION 1 840 3 .X 840 3 .X 840 10 .XXXX 940 10 .XXXX 940 10 .XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	301B405K 4.0894 STC.40ARD DEVIATION 19.80 84.0894 STC.40ARD DEVIATION 10.20 840 3 .X XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	301B405K 4.0894 STC.10ARD DEVIATION 1820 10 STC.10ARD DEVIATION 2.80 1.80 STC.10ARD STC	301B405K 4.0894 STC.40ARD DEVIATION 1820 1820 3 -x 860 3 -x 860 10 -xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

0 HOURS	0.0430	*1				×	;	• XXXXXX	****	**************	• **********	**************************	**************************************	• XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	***************************************	**************************************	**************************************	×	**************************************	-xxxx cxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	**************************************	. K K K K X X X K K K K K K K K K K K K	**************************************		×	#	XXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	XXXXXXXXXXXXXXX	XXX	THE STANKEN STANKE STAN	××			
73K	MINIME	STAI			×	××·	××	XX.	XX	XX*	XX.	Ω×.	XX.	××·	Ω×.	XX.	×	XX.	×××	XX.	XX.	XX.	XX.	XX	×ו	(XX.	XX.	XX.	xx.	XX.	XXXX.	XX.	XXX.	×		
01Ċ4′	1925	0.0469		_	~	~	د ٠	7.1	7	34	39	15	39	%	67	113	65	151	103	192	41	168	68	611	69	100	64	65	35	39	σ	17	•	m	-	
SCS-301C473K	INTS	0	COCNT	0.043	0.043	0.044	550-0	0.044	0.044	0.045	0.045	0.045	0.045	0.046	950.0	0.046	0.046	150.0	0.0.7	0.047	0.047	0.048	0.048	0.048	0.043	0.049	0.049	0.043	0.049	0.050	0.050	0.050	0.050	0.051	0.051	
<u>~ 33 ≈ 7</u>	NO OF DATA POINTS	VAL	FR34 10	0.043	0.043	0.043	550.0	0.044	0.044	0.044	0.045	5,0.0	0.045	550.0	9,0.0	0.0.6	0.046	0.046	0.047			0.047		0.048	0.048	0.048	6+0-0	6.044	0.049	6,0.0	0.050	0.050	0.050	0.050	0.051	

0 HOURS	0.2984 8 704 MAXIMUM 0.3591 8 27 MEDIAN 0.3279	0.0135			XXX			×	悪	-	×		×	KAXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		• KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK		**************************************	**************************************		**************************************	• ************************************	**************************************				. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	***************************************	אלאאלאא	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	***			
₩.	MINIMON	STANDARD		XX.	********	*****	XXXXXXX.	* ***	XXXXXXX	******	. *****	XXXXXX*	******	*XXXXXX	****	*****	*****	XXXXXXX	****	****	*****	*****	****	CXXXXX.	*****	. ****	XXXXXX*	. * * * * *	CXXXXX.	XXXXXX.	CXXXXXX.	*******	×	×	
C334]	1925	0.3277		•	<u>*</u>	5 *	23	23	44	%	ş	15	95	109	96	124	601	108	911	118	135	111	16	£	Š	5.	64	0.4	35	23	81	13	7	7	
SCS-301C334K			COCNT	0.300	0.302	0.304	0.306	0.308	0.310	0.312	0.314	3.316	0.31A	0.323	0.322	0.324	0.326	0.328	0.330	0.332	0.334	0.336	0.33R	0.340	0.342	0.344	0.345	U. 34B	0.350	0.352	0.354	0.356	0.353	0.360	
S	NC OF DATA POINTS	MEAN VALUE	FRO. TO	0.298	0.300	0.302	0.30	0.306	0.308	0.310	0.312	0.314	0.316	0.318	0.320	0.322	0.324	0.326	0.328	0.330	0.332	0.334	0.336	0.338	0.340	0.342	0.344	0.346	0.348	0.350	C.352	0.354	0.356	0.358	
		.	٠.	_								•		_							1	2	7 -								_			•	

													3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		******																		•
	4 MEDIAN 12.0000							•			3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	XXXX	XXXXXXX	IN KKXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	::::::::::::::::::::::::::::::::::::::	KKKKKKKKKKKKK																	
	ART 8 0000 OF 11 411											inde exekerekerekerekerekerekerekerekerekerek	I XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	CXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	CKKKKKKKKKKKKKKKKK	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	CKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK															1 1	
0 HOURS		ATTON 3.3009						•		-	-	-						******	×××												•		
. .		STANDARD DEVI				ו	×	*xxx	•	•	•	•						* * * * * * * * * * * * * * * * * * *	***********	*********	5 .XXXXXX		K 1			****	×,		×				
R104		11.8270		_	~	- N	•		22	99	108		217				175	. 8	5	35	~	-	•	-		2	~	_	•	_	~	•	_
SCS-301 B104K	1	, (I	COUNT	1.000	2.000	3.000	4. 000	5.000	6.000	7.000	B.000	9.000	10.000	11.000	12.000	13.000	14.000	15.000	16.000	17.000	18.000	19.000	20.000	21.000	22.000	23.000	24.000	25.000	26.000	27.000	28.000	29.000	30.00
<i>V.</i>		HEAN VALUE	FROM TO	8	1.000	2.000	3.000	٠.000	2.000	6.000	1.000	8.000	000.6	10.000	11.000	12.000	13.000	14.000	15.000	000.91	17.000	18.060	000.61	20.000	. 21.000	22.000	23.000	24.000	25.000	26.000	27.000	28.000	29.000

0 HOURS	INTERNA 35.0000 # 1512 MAXIMUM 60.0000 # 1313 MEDIAN 45.0000	10M 4*4970 .					HHHH	. H K K K K K K K K K K K K K K K K K K	HENKERKKERKEKKERKEKKERKEKKERKEKKEKKEKKEKKEK	nkindhkin xxxxxxxii akkin xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	. Kanarahannanan mananan manana	a na ka		. KRKRHHYKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	n na		. KAKRARRAKARAKKAKKAKKAKKAKKIKKKAKKAKKAKKAKKKKKKKK	**************************************	**************************************		**************************************	нинини	אאא							
	MINIMUM 35.0000	STANDARD DEVIATION			×××.	. XXXXXXXX	. XXXXXXXXXXXXXX	*************	**************************************	****************	**************************************	**************	***************************************	~	***********	**************************************		******************	**************************************	**************************************	**************************************	***********	**************************************	*********	********	*******	×	****	***	
105K	1925	582		-	~	19	35	80	101	125	135	153	747	169	178	182	136	152	4	54	63	45	34	21	23	13	~	10	•	
SCS-301B105K	ļ	45.6582	COUNT	35.000	36.000	37.000	38.000	39.000	40.000	41.000	45.000	43.000	44.000	45.000	46.000	47.000	48.000	49.000	50.000	51.000	52.000	53.000	24.000	55.000	56.000	57,000	58.000	59.000	000.09	
Š	NO OF DATA POINTS	MEAN VALUE	FROM TO	34.000	35.000	36.000	37.000	38.000	39.000	40.000	000·1+	45.060	43.000	44.000	45.000	46.000	47.000	* C00-8*	49.000	20.000	21.000	22.000	53.000	24.000	55.000	26.000	57.000	58.000	89.000	

;		l					1						,												1							•			
									:		•		į			KKKKKKKKKKITHITITITITITITITITITITITITITI									1						1				•!
		1	1							:						XXXX				•											i	i			
-		!		! !		:				! 				:		XXXX														٠.		l :			!
:										:	:			:		XXXX																:			
ç	2	1		i		:		 		:	1.			•		KXXX	KKKK													•		} !			-
		•					•	 		:						(XXX)	(XXX)															i			:
1	2	:						1		•				!		(XXX)	(XXX)															:			:
•	,					!				:		1				XXX	XXX									i						į			i
	MED! AN	i :						1						:		XXXX	XXX															į			
i		1		:					•							XXXX	XXX															!			
:	230	:		:										i	XXX	XXXX	* * * *	(((
į	-														***	X X X	() ()	(((:						;		:	
	8 .	•						-		•				:	*	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		4								:						1		•	
-	64.0000							1				:		:		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \								:						1			
1	•	:		:				1							,		KARANANANANANANANANANANANANANANANANANANA	777												•		1			
ļ	Ę	ļ		:										;	3		444	XXX								;						1		•	
	MAXIMUM							:							3	4	X X X X X X X X X X X X X X X X X X X	XXXX								:						1			
	Ì	2579						ı							3	X X X X X X X X X X X X X X X X X X X	XXXX	XXXX														1		•	
ຜູ	376	;						1							2	X X X X	XXX	KXXX	_																
HOURS	•	:						1		:				:	K	XXX	XXX	XXX	CXXXXXX													!			
Ĭ	000	10		•															~							٠						i		i	
	•	VIAT						•							XXX	×	XXX	XXX	XXX													:		; ;	
	: : 1	STANDARD DEVIATION		:										:	. XXXXXXXXXXXX	**********	************	************	• KXXXXXXXXXXX	******	×											!			
	Ē	TOAR						1							×××	×××	XXXX	XXXX	×××	X	• XXXXXXX	×												;	
	MINIMUM	STA			×	×		:				1	××	×	×	××	××	××.	××	×	×	*XX										1			
SCS-301B405K	izi İ			ا ک	•	∞	•	m.	~	~		٠.	<u>~</u>		124	349	598	664	140	68	45	20	٠			0	_	0	0	0		•	0	-	
1 B4	1925	29.7538	!	;	_	_	_	;	_	_	_		_						_	_			0	_	9	٥.	0	0	0	0	•	: ه	0	; 0	
-30	S	29.	COUNT	000	6.086	000.8	0000-0	2.000	4.000	6.000	000-9	20.000	22.000	24.000	26.000	28.000	30.00	32.000	34.000	36.000	33.000	000.00	45.000	44.000	46.000	48.000	50.000	52.000	24.000	26.000	58.000	900.09	62.000	• 000	
SCS	DINT	,	_	•	•	•	2	12	╧	2	=	20	22	54	26	~	×	. 32	m	ř	•	¥	÷	7	3	7	5	Š	Ň	Š	Ñ	3	ø	\$ 9	
	MO OF DATA POLNTS	3	2	00	8	8	00	00	8	00	8	CO	င္ပ	00	00	00	00	000	00	00	00	00	900	000	000	000	000	000	000	000	200	000	S	8	
	VG 4	MEAN VALUE	FROM	2.000	4.000	6.000	8.000	10.000	12.000	14.000	16.000	18.000	20,000	22.000	24.000	26.000	28.000	30.000	32.000	34.000	36.000	36.000	40.000	43.000	44.000	45.000	48.000	50.000	52.000	54.000	56.030	58.000	600.09	62.000	
	2	¥	ī.										-	_	,	-	•									1	ı								
	- E	•	i.		ı						!	1								.1	3.1	٥	_												_,

INITIAL DF

3K 0 HOURS	MINIMUM 1.0000 # 2 MAXIMUM 29.0000 # 1769 MEDIAN 12.0000	: : 	*******	• ******	******	*XXXXXXX	**************************************	***************************************	• ***************	·XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	• XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	• XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	+XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	*XXXXXXXXXXXXXXXXXX	**************************************	• ******	******	•*****	*****	******	*XXXXXXXX	**************************************	* KXXXXXXXX	******	*XXXXX		**	
01C47	1925	12.2987 UNT	56	5 8	35	23	30	20	64	107	175	173	238	516	196	911	81	25	38	33	21	61	91	38	31	48	27	21	17	~	*	
SCS-301C473K	INTS	12.2 COUNT	1.000	2.000	3.000	4.000	5.000	6.000	7_000	8.000	000.6	10.000	11.000	12.000	13.000	14.000	15.000	16.000	17.000	18.000	19.000	20.000	21.000	22.000	23.000	24.000	25.000	26.000	27.000	28.000	29.000	
olo v po Pol	NO GF DATA POINTS	MEAN VALUE FROM TO	00000	000*:	2.000	3.000	000*+	2.000	6.000	1.000	8.000	000*6	10.300	11.000	12.090	13.030	14.000	15.030	16.003		18.000		20.000	21.000	22.000	23.000	24.000	25.000	26.000	27.000	28.000	

K 0 HOITRS	1925 MINIMUM 0.9034 # 687 MAXIMUM 1.0696 # 105 MEDIAM 0.9471	RD 0EV IAT 10N 0.0215			××ו	• XXXXXXXXXXXX	×	×	×	• XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		•XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	• XXXXXXXXXXXXXXXXXX	******								
C105	925	.59		7	*	2,	126	1 82	276	434	392	286	125	2.2	~	0	9	~			0	7
SCS-301C105K		0.9659	COUNT	0.910	0.920	0.930	0.940	0.950	095.0	0.970	0.980	066.0	1.000	010-1	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090
	NO OF DATA POINTS	MEAN VALUE	FROM TO	005.0	0.910	0.920	0.930	0.940	0.950	0.960	0.970	0.980	0.00	1.000	1.010	1.020	1.030	0.00	1.050	1.060	0.01	090-1

TABLE XXII

INITIAL DF

5K 0 HOURS	MINIMUM 27.0000 # 1296 MAXIMUM 60.0000 # 1534 MEDIAN 43.0000					***			K K K K K K K K K K K K K K K K K K K	* XXXXXXXXX	**************************************	***************************************			* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	**************************************	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	* KYNYRYKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	**************************************	**************************************	**************************************		• WHITH WALKEN HANDER H	**************************************	• ************************************	***************************************	• XXXXXXXXXXXXXXX	**************************************	*****	XX	XXXX*		• XXXX
1010	1925	361	-	0	0	г	7		0	8	37	73	93	113	108	125	134	151	146	139	139	143	63	88	= :	•	62 41	27	35	5 8	σ	=	6 0	•	i i
SCS-301C105K	DINTS		27.000	28.000	29.000	30.000	31.000	32.000	33.000	34.000	35.000	36.000	31.000	38.000	39.000	40.000	41.000	45.000	43.000	44.000	45.000	46.030	47.000	48.000	000 **	50.000	52.000	53.000	24.000	55.000	26.000	57.000	28.000	59.000	000*09
	IN OF DATA POINTS	Ž	26.000	27.000	28.000	29.300	30.000	31.000	32.000	33,000	34.000	35.000	36.000	37.900	38.000	39.000	40.000	41.000	42.000	43.000	44.000	45.000	46.000	47.000	000 84	600.64	51.000	52,000	53.000	24.000	25.000	26.000	57.000	58.000	- 000*66
بينى تعلقا	4.	71 <u>5</u> 21		₩ a 7			-	امندا	ch _{ia}		e s	التة	45	-	<u> </u>	Są:	ėžģ	es é	1	3.	1.		è	water	ė, į	ā ⇒÷	. Ale	iait	er.	kris.	rica	L aytes	in a	ės ai	: -

Computer X's - Relative display of column 3 numbers.

Total Quantity - The total of the number measured differs from the initial capacity total numbers on some histograms because the computer program did not itemize units exhibiting 0 capacity change.

Dissipation Factor

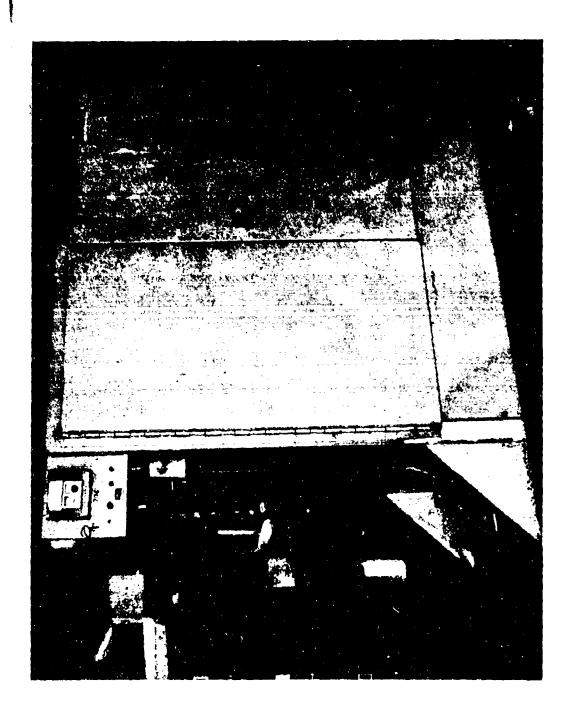
Columns 1 and 2 - Percent DF. Move decimal point 2 places to the left and read % in both histograms and listing

Column 3 - Number of units between the increments listed in columns 1 and 2

Computer X's - Relative display of column 3 numbers.

3.8.3 Test Facilities

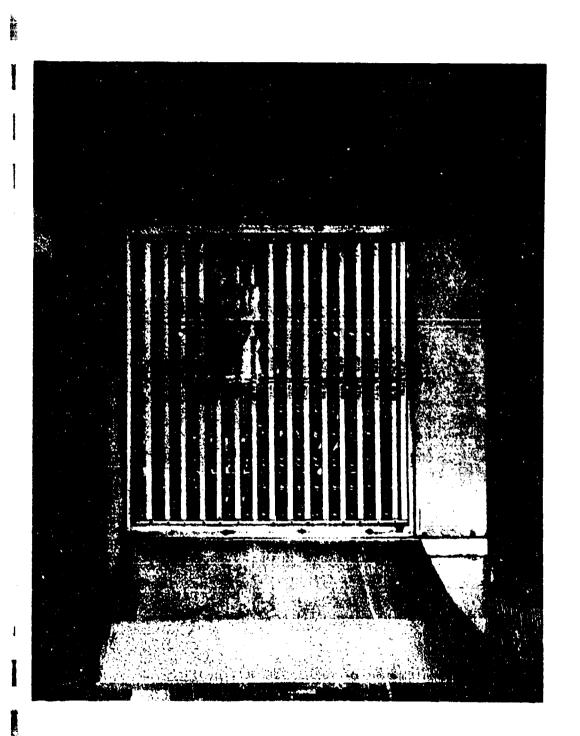
The specially prepared ovens for the 10,000 hour test of the First Production Lot of capacitors consisted of three (3) thermostatically controlled chambers (see Figure 13). Each oven chamber held thirty (30) metal racks (see Figure 14). Each rack held mounting clips to accommodate one-hundred thirty-five (135) capacitors (see Figure 15). On the back of each rack was mounted two (2) one-hundred and four (104) pin connectors (see Figure 15). The mating portion of each connector was mounted on the back wall of the oven chamber in such a position as to properly mate with the rack mounted portion of the connectors when the rack was positioned into the side slides provided (see Figure 14). A common connection was carried in the rack frame



One of the 3 thermostatically controlled oven chambers for 125°C 10,000 hour test

Test Oven Figure 13

Figure 14



かられている かんかん かんしゅうしゅうしゅうしょう

A STATE OF THE PARTY OF

One of the 3 ovens, with 3 racks removed to show side slides and oven mounted portion of the 104 pin connectors



Back view of 2 of the capacitor test racks showing the mounting of the capacitors and the 2 connectors per rack

Capacitor Test Racks

Figure 15

for one side of each capacitor. The other terminal of each capacitor was connected to a pin of the connector via interconnecting leads.

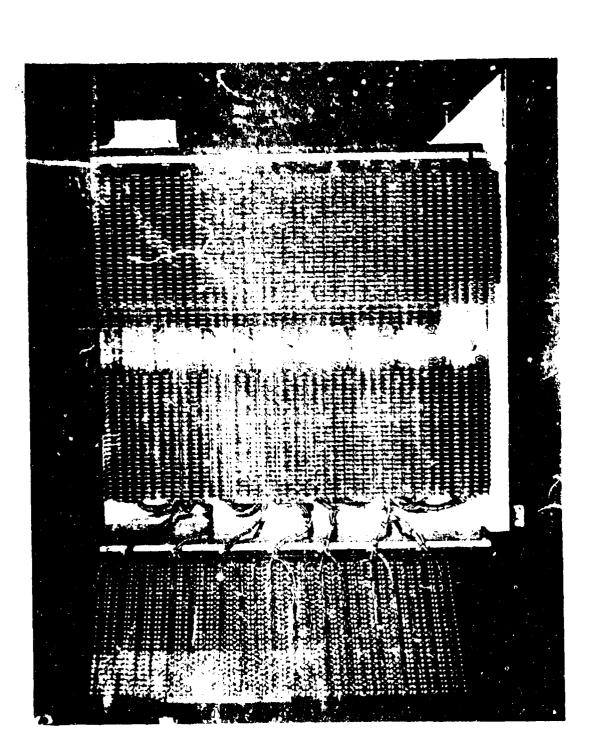
Each terminal of the oven wall mounted portion of the connector corresponding to a used terminal of the rack mounted portion of the connector was connected to either a 4700 or 5000 ohm resistor the opposite end of which was in turn connected to the required power supply. The resistors were mounted on hinged racks on the outside back of the oven. The racks were so designed that when swung out in the fashion of a hinged door each of the series resistors could be inspected visually or checked with an ohmeter to verify its condition (see Figure 16).

3.8.4 Test Inspection

During periodic inspections, at 250, 2000, 4000, 6000, and 8000 hours, 50 pieces of each capacitor rating were chosen at random and monitored for continued parametric conformance to the specification limits. At the 1000 and 10,000 hour inspection periods, all capacitance values were measured and recorded. Table XXIII is a histogram recording of the capacity values measured at 1000 hours and Table XXIV is a histogram recording of the capacity values measured at 10,000 hours. The computer program developed the Delta C histogram for each period displayed as Table XXV for 1000 hours and Table XXVI for 10,000 hours. All delta values were determined to be within the 10% limit (see 3, 8, 2, 1).

Series Resistor Panels





4700/5000 Ohm series resistors mounted on hinged panels at back of oven

TABLE XXIII

CAPACITIES

J
#
04K
_
m
7
30
- 1
Ñ
SCS
S)

1000 HOURS

•						•				FEREN	KHHHKKHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH	<u>Kanakananananananananananananananananana</u>	- CHERENTERENTERENTERENTERENTERENTERENTEREN	<u> </u>	KXXXXX						
66	:									XXXXX.	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX.						
661									××	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX						
0.1102									XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXX	XXXXXXXXX						
ι							•	_	CXXXX	CXXXX	KXXXX	CXXXX	CXXXX	CXXXX	CXXXX	KKKK					
21 HAXINUM 0.0029							XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	:	. Kanakananananananananananananananananana	KXXXXXXXXXXXXXXXXX	KKKKKKXXXXXXXXX	******	KXXXXXXXXXXXXX XXX	: XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXX				
INIMUM 0.0916 STANDARD DEVIATION					×	XXXX	XXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXX	**************************************	KKKKKKKKKKKKKKK	XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX	XXXX			
MINIMUM STANDARD			×	XXX.	. XXXXXXX	. XXXXXXXXXXX	******	******	*XXXXXX	*XXXXXXX	-XXXXXXX	XXXXXXX.	. XXXXXXX	*******	******	* X X X X X X *	XXXXXXX.	*******	××.	×	
1925 115		-	*	•	22	33	~	98	140	174	223	292	268	218	178	110	9	32	_	4	-
INTS 192	C00A7	260.0	0.093	0.094	0.095	960.0	0.097	0.098	0.099	0.100	301-0	201.0	0.103	0.104	0.105	901.0	101.0	0.108	0.109	0.110	0.111
MO OF DATA POINTS 1925 MINIMUM MEAN VALUE 6.1015 STANDAR	FROM TO	160.0	0.092	0.093	960.0	0.095	0.096	0.097	0.098	0.099	001.0	0.101	0.102	0.103	0.104	0.105	901.0	0.107	0.:08	0.109	0.110
¥	<u>i</u>			_	_		L_	_			_		<u></u>	_		_	_1	4	1		

Sanoh neo!	RINIFUM G-537" # 2467 MAKINUM 1-1039 # 1431 MEDIAN 1-0518		· · · · · · · · · · · · · · · · · · ·				xx.	×××	THE PROPERTY OF THE PROPERTY O	• 大英國民族政策	XXXXXXX	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	* PHYHHHHHHHHHHHHHHHHHHHHHHHHHH	• » » XXXXX " " « KXXXX KXXXXXXXXXXXXXXXXXXXXXXXXXXXX	•KKI KAKI KAKIKI KAKIKI KAKIKIKIKI KAKIKI KAKIKIKI KAKIKIKIKI	•XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	- H H X H H H H H H H H H H H H H H H H	• AP NATATARE CARIANNE AND EXPERIENCE AND EXPERIENC	. X X X B B B X B B B B B B B B B B B B	- ANNERSKYK		
∑¦	1925 R		İ		0	•	•	0 -	: : 1	26	36	48	153	528	316	364	308	504	٨	35	٦	
-301]		1. Dyn.	COCHA	0.940	0.950	0.96.0	,913	0.980	D- 99C	000	710:	3.020	30	040	.050	20.0	0,0.	000.	90.	.1.	011.	
SCS	- חושבי		,-	ó	Ġ	Ġ	.•	ö	Ġ	ρĺ	•	ń	•	•	:	;	~	-i	۰۰	-	-	
	THE CALK TOTHER	SI, IKA MYSH	D' NOTE	0.9.0	0.340	0.950	096.0	0.970	096-0	066.7	1.600	210*1	1.350	1.930	1.040	1 .050	6,61	0.0.1	1.080	1.090	i.137	

TABLE XXIII

- 1	MEDIAN 4.0950					•								77777777777777777777777777777777777777	KARAKAKAKAKAKAKAKAKAA 	KAMMANAMANANANANANANANANANANANANANANANAN	(KRKELKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	***************************************	****													
1000 HOURS	INIMUM 3.8030 8 484 MAXIMUM 4.4020 6 446 STANDARD DEVENTOR 0.1177									×		м.	ж							nkak kereken kankak kankak kanak kanak kanak kanak kankak kanak kanak kanak kanak kanak kanak kanak kanak kanak	_		NAMES OF THE PROPERTY OF THE P		· XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX								•	
ίΚ	N. NI MUM STANDARD	1	1		××.	XXXXX.	*XXXX	. XXXXXXX	* KKKKKKKKK	*XXXXXXX	*XXXXXX	*****	****	XXXXXXX.	*XXXXXX	. KKKKKK	*****	******	XXXXXX.	, XXXXXXX	***	XXXXXX	XXXXXX.	*****	****	****	. KKKK	XX.	××.	**	,	;		
R40	1925	: :	 ;	~ .	-⊙	2	2	*	23	လိ	\$3	37	5	142	165	9.	161	178	185	143	120	R	? (36	י ה ה	91	0	•	ţ	<u>ب</u> ا	~			
SCS-301R405K	4	COUNT	3.820	3.840	3.860	3.880	3.900	3.920	3,43	3.960	3.980	4.000	4.020	4.040	4.060	090.4	4.100	4.120	4.140	4.160	4.180	4.200	4.220		7.280	4.300	4.320	4.340	4.360	4.380	4.400	4.420		
-	NO OF DATA POLATS	FROM TO	3.833	3.520	3.840	3.860	3.88	3.930	3.920	9.940	3.960	3.980	000.0	4.020	4.040	4.050	080°÷	\$.100	4.120	4.15	•	180	4.200	0.7.4	042.4	4.280	4.300	4.320	4.340	4.360	4.340	4.400		
- 1	} _	į.	- () } .	, =4			Ì		<u> </u>	į	,			- 1	,1,	l 1	<u>,-</u> 2	4	3	۹.,,		<i>;</i>	ı.	ą i	٠,	4-	1		-3 4		J.	, ag .	_4

TABLE XYIII

1600 HOURS	0.042A #	+ï00°0				XX	*******	******	**************************************	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	- XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	**************************************	**************************************	• XXX XHXXXXXX 4 KXXXXXXXXXXXXXXXXXXXXXXX	• N N N N N N N N N N N N N N N N N N N	- x x x x x x x x x x x x x x x x x x x	- XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	•XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	• XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	- KANNA KKANNAKHAKKANKKANKKANANNAKANKKANKKANKKAN	- KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	- nnan karakarakannannanna karakannakanna	PRIKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	**************************************	* KAKKKETEKKKKKEKK	- TYXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	XTXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	*X*XXXXX	XXX	×	
73K	PI NI NOM	STAND		×	×	×××.	XXXX.	XXXX.	XXXX.	XXXX.	XXXX.	XXXX.	XXXX.	*XXXX	* XXXX	XXXX.	XXXX.	XXXX*	.xxx.	· XXXX	XXXX.	-XXXX	XXXX.	X X X X *	XXXX	XXXX.	XXXX	- XXXX	X I X X ·	.XAAX	* XXXX	×ו	×
)1C4	1925	0.0468	-	4 .	•	~	18	91	41	36	65	55	104	62	121	95	191	109	187	101	157	96	116	22	8	47	62	35	82	18	0	.	7
SCS-301C473K	INTS	0-0	F 700 C	0.00	0.044	0.044	0-044	940.0	0.045	0.045	0.045	0.045	0.046	9,000	3.046	0.046	1,0.0	0.047	2 50 0	1,000	0.048	0.048	0.048	0.048	6 90 0	0.049	670-0	0.049	0.050	0.050	0.050	0.050	0.051
	NO OF DATA POINTS	HEAN VALUE		0.043	0.043	0.044	0.044	0.044	0.044	0.045	0.045	0.045	0.045	0.045	950.0	0.046	970.0		250.0	2 90°0 4		0.048	0.048	0.048	0.048	6+0-0	670-0	0.049	6.0.0	0.050	0.050	0.050	0.050

TABLE NXIII

CAPACITIES

1000 HOURS

SCS-301C334K

0.5670 # 27 MEDIAN 0.3289									XXXX	THE STATE OF THE S	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	nababababababababababababababababababab		KXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	. K K K K K K K K K K K K K K K K K K K	/XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXX								
								×	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	CXXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXXX	×	XXX						
INTERNAL 0.2963 # 811 MAXIMUM	¥C.			CXX	XXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX	**************************************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	******************************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	*************************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************	******************************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	X X X X X X X X X X X X X X X X X X X	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	XXXXXXXXXXXXXXXXXXXXXXX	***********	XXXXXXXXXXXX			
MINIMON	STANDA		***	*XXXXXXX	· XXXXX	- XXXXX	-XXXXX	*XXXX	* XXXX	*XXXXX	- XXXXX	XXXXX.	-XXXXX	XXXX	*XXXXX	* XXXXX	(XXXXX	· XXXXX	• XXXXX	*XXXX	• XXXXX	*XXXXX	. XXXXX	CXXXXX.	*XXXXX	. XXXXX		×
1925	U.3284 NT	~	*	13	27	38	47	88	90	16	121	133	138	153	143	140	155	127	130	86	28	79	41	31	30	•	-	~
	COUNT 1	0.298	C-300	0.303	0.305	0.308	0.310	0.313	0.315	0.318	0.320	0.323	0.325	0.328	0.330	0.333	0.335	0.333	0.340	0.343	0.345	0.348	0.350	0.353	0.355	0.358	0.360	0.363
NO OF DATA POINTS	FROM TO	0.295	0.298	00.300	0.303	0.305	. 808.0	0.310	0.313	0.315	0.318	0.320	0.323	0.325	0.328	0.330	0.333	966.0		0,340	0.343	0.345	0.348	0.350	0.353	0.355	0.458	0.360

TABLE XXIII

CAPACITIES

0996.0							***************************************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX											
	٠					XXXXXXXXXX	XXXXXXXXX	XXXXXXXXXX	XXXXX		i :								
1.0880 # 195 MEDIAN						XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX										
					XXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXXX	XXXXXXXXXX								•		
1000 HOURS				XXXXXXXXXXXX	CXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXX									
			XXXXXX	XXXXXXXXXXX	_				KXXXXXXXXXX										
MINIMUM 0.9		*xxx	***********	***********	**********	*****	***********	*****	***********	*****	*XXXXX								
-C105K	,	6	12	129	189	588	428	364	274	115	92	4	0	0	_	_	~	0	~
•	COUNT	0.920	0.930	0.940	0.950	0.960	0.970	0.980	066.0	1.000	1.010	1.020	1.030	050.1	1.050	1.060	1.070	1.080	1.090
SCS NO OF DATA POINTS	FR04 TO	016.0	0.920	0.630	0.940	0.950	0.960	0.970	0.980	0-6-0	. 30° I	1.010	1.020	1.030	1.040	1.050	090-1	1.070	1.080

And the state of t

CAPACITIES

	HEU! AN				-				•			***************************************	HERMANN MENNEN STATES OF THE S	H H H H H H H H H H H H H H H H H H H	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	***********	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX									
:								i			XXXX	X X X	XXXX	XXXX	KKK	XXXX	×××									
	0.1112 # 199							!			* * * * *	***	****	X		XXXX	XXXX									
,	0							:			* * * * * * * * * * * * * * * * * * * *	***	***	***	***		***	•								
10, 000 HOURS	INTHUM 0.0909 # 21 MAXIMUM	IDARD DEVIATION U.UGSU						*XXXXXX	**********	. XXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	TO COULT OF THE PROPERTY AND THE PROPERT		**************************************			***************************************	***************************************	**************************************	. <i>א</i> אעאאאאאאאאאאאאאאאא	XXXXXXXX	XXXX				
	_	STA				××.	XXX.	××	×		•	•				•			•	₹.	×.	€.	₹.	×.		
B104	1925	9101-0			-	•	01	23	43	2	100	144	169	548	539	268	194	176	104	7.8	26			67.3		
SCS-301B104K	SI		COUNT	160.0	0.092	0.093	0.094	0.095	960.0	0.097	960.0	0.099	001.0	0.101	0.102	0.103	0.104	0.105	0.106	0.107	901.0	0.109	0.110	3.111	0.112	
SCS	NO DE DATA POINTS	MEAN VALUE	9	060°0	160*0							0.098	660.0	0.100			0.103	0.104	0.105			90100	•	0.113	0.111	

	1.1260 # 1375 MEDIAN 1.0631	-										XXXX	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	ahka keeraka kaka kaka kaka ka ka ka ka ka ka ka	KHHKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	<i>arakanananananananananananananananananan</i>	XXXX			
10, 000 HOURS	MINIMUM C.9561 # 1487 MAXIMUM	STANDARD DEVIATION 0.0281	•		-	×	****	XXXXXX	*****	. * * * * * * * * * * * * * * * * * * *	. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	.XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	. NA NA NAN NA NA NA NA NA NA NA NA NA NA	. XX XX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	. * * * * * * * * * * * * * * * * * * *	. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	.×××××××××××××××××××××××××××××××××××××	. X X X X X X X X X X X X X X X X X X X	.xxxxxxxxxxx	אאאאא	
3105K	1925 M			-4	~	σ-	1.5	24	2.1	4.5	100	145	228	310	304	242	226	140	19	53	•
SCS-301B105K		1.0615	COUNT	096.0	0.970	0.980	0.990	1.000	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100	1.10	1.120	1.130
SC	D OF DATA POINTS	MEAN VALUE	FROM TO	0.950	096.0	0.970	0.780	0.490	1.000	010.1	1.023	1.030	1.040	1.050	1.060	1.070	1.080	1.090	001-1	1.110	1-120

	4.4750 # 359 MEDIAN 4.1330 F F F F F F F F F F F F F F F F F F							The second second is the second secon				XX		nkakakakakakakakakakakakakakakakakakaka		n n n n n n n n n n n n n n n n n n n		n n n n n n n n n n n n n n n n n n n													•
10, 000 HOURS	484 MAKIMUM 4.	0.1265					-			XXXXXXXXXXXXXX		NAXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXX	XXXXXXXXXXXXXXXXXXXXXXX		HEXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		XXXX									
	MINIMUM 3.8290 #	STANDARD DEVIATION	•			. ***	•	*****	****	**************************************		*******************	**************************************	XXXX	*XXXXXXXX	************	**************************************	**************************************	**************************************	×	**************************************	**************************************	***	*******	×	****		×			
B4051	1925	335		7	m	<u>+</u>	7	62	20	==	35	162	100	346	35	284	119	278	36	143	1,4	45	0	37	v	16	-	S	~		
SCS-301B405K	1	4.1335	COUNT	3.850	3.875	3.900	3.925	3.950	3.975	4.000	4.025	4.050	4.075	4.100	4.125	4.150	4.175	4.200	4.225	4.250	4.275	4.300	4.325	4.350	4.375	4.400	4.425	4.450	4.475	4.500	
S	NO OF DATA PUINTS	MEAN VALUE	FROM TO	3.825	3.850	3.875	3.900	3.925	3.950	3.975	4.000	4.025	4.650	4.075	4.100	4.125	4-150	4.175	4.200	4.225	4.250	4.275	4.300	4.325	4.350	4.375	004.4	4.425	4.450	4.435	
																						_	Ė	Ė					÷	_	-

TABLF XXIV

CAPACITIES

K 10,000 HOURS	MINIMUM 0.0423 # 330 MAXIMUM 0.0517 # 1406 HEDIAN 0.0473						XXX.	*******	**************************************		* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	* akaakakakakakakakakakakakakakakakakaka	**************************************	** XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	***************************************	* XXX KXXX XXXX XXXXXXXXXXXXXXXXXXXXXXX	• *************	***************************************	*****	×××,			
1C473	1925	0.0472			~	~	10	2.1	86	103	210	168	292	516	313	133	183	19	19	61	15	0	-	
SCS-301C473K	STATE	0	COUNT	0.043	0.043	9.044	0.044	0.045	0.345	0.046	9,0.0	0.047	0.047	0.04R	0.048	650.0	0.044	0.050	0.050	0.051	0.051	0.052	0.052	
	NO OF DATA POINTS	MEAN VALUE	FROM TO	0.042	0.043	0.043	0.044	0.044	0.045	0.045	9,0.0	0.046	0.047	0.047	0.048	0.048	0.049	0.0.0	0.050	050*)	0.051	0.051	0.052	

34K 10, 000 HOURS	MINIMUM 0.2993 # 777 MAXIMUM 0.3683 # 27 MEDIAN 0.3321 STANDARD DEVIATION 0.0142				• ****	XXXXX*	• XXXXXXXXXXXXXXXXXX			, *************************************	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	• XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	×	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************	**************************************	• X/XX/HXXHHHHHHH	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	****************************	******	***************************************	xxxx.	• ************		×		
)1C3	1925	,	_		56	16	63	20	90	0,	136	4.7	182		~	56	9 8 1		210	74	1+1	4.4	701	<u>د</u> .	53	13	39	7	4	-	2
SCS-301C334K	0	LUNCO	0.300	0.303	0.305	0.338	0.310	0.313	0.315	0.318	0.320	0.323	0.325	0.32H	0.330	0.333	0.335	0.338	0.340	0.343	0.345	0.34A	0.350	0.353	0.355	0.353	0. 160	0.363	0.365	0.368	0.370
	OF DATA PEINTS MEAN VALUE	FRCM 10	0.238	0.300	0.303	0.335	0.308	016-0	0.313	0.315	C-318	0.320	0.323	0.325	0.328	0.330	0.335	0.335	0.338	0.3.0	0.343	0.345	3.348	0.150	0.353	0.355	Ú.358	0.360	0.363	0.365	0.368

1.0895 # 195 MEDIAN D. 9699		
05K 10,000 HOURS MINIMUM 0.8991 6 687 MAXIMUM STANDARD DEVIATION 9.0233	**************************************	
1925 0.9702	CCUNT 1 0.900 1 0.910 1 1 0.920 21 0.940 165 0.940 240 0.940 176 1.010 104 1.010 104 1.050 0 1	1 050*1
SC DATA POINTS	9883080000	1.080

	inkkenkkenkkerkenkenkenkenkenkenkenkenkenkenkenkkenk	. K K K K K K K K K K K K K K K K K K K	KKKKKKK											
6000.0	*********	***************************************	*******											
MEDIAN	*****	XXXXXXXXX	KXXXXXXXXXXXX						•				;	
£ 1462	XXXXXX	XXXXXX	XXXXXX	XXXXXX										
0.0012 # 1462	*****	*******	KXXXXXXXXXXXX	****	KXXXXXXXX									
OUKS 19 HAXIHUM 0.0002	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	IKXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	(KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	nananananan karanan ka	<i>CKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK</i>	IXXXXXXXXXXX								
STANDARD DEVIATION 0.00	**************************************	***************************************	************************************	•KXXXXXXXXXXXXXXXXX	**************************************	**************	. ********	******	**************************************		****	×.		
	165 383	359	34.5	218	187	0 126	20 20	۵۳,	0 4		0	•	o (~
301	0.000	0.000	00000	0.000	0.001	0.001	0.001	0.001	0.30	0.00	0.001	0.001	0.001	0.001
SCS- 10 OF DATA POINTS HEAN VALUE	900	00000	0.000	000.0	0.000	100.0	0.001	0.001	0.001	0.001	0.001	0.001	00.0	0.001

:	· .,		XXXXXXXXXXX																						•	
	0.0015		XXXXXXXXXX				•																			
	MEDIAN		XXXXXXXXXX	XXX					•										•						:	
	214 8		(XXXXXXXXXX	*********																						1
	0.0221		CXXXXXXXXX	XXXXXXXXXX							•															:
OURS	13 HAKIRIM		nananannan an	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	************************															•						
1000 HOURS	0.0000		KAKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	CXXXXXXXXXXXX	KXXXXXXXXXX	KKKKKKKKKK	CKKKK																			
×	MINIMUM STANDARD DE		XXXXXXXXXX*	.XXXXXXXXX	*XXXXXXXXX	. XXXXXXXXX	*XXXXXXXXX	******	. XXXXXX	*xx	XX.	×.	×			•			-							
B105	1928		723	699	282	091	104	19	20	92	19	2	13	4	7	~	0	~	0	0	ن	0	0	0		
SCS-301B105K	. 0	COUNT	0.001	0.002	0.003	,20.0	0.005	0.006	0.007	0.008	0.009	0.010	110.0	0.012	0.013	410.0	0.015	0.016	0.017	0.018	0.019	0.020	0.021	0.022	0.023	
Ś	NO OF DATA POINTS	FROM TO	0.000	0-001	0.002	0.003	0.004	0.005	900.0	0.007	800.0	600.0	0.010	110.0	0.012	0.013	0.014	0.015	910.0	0.017	0.018	0.019	0.020	6.021	0.022	

			:	***	***																
	-			XXXXXXXXXXX	KKKKKKKKKK										:						
-	0.010			***********	CXXXXXXXXXXX	CAXXXXXXXXX		•	•						•						
	MEDIAN			XXXXXXXXX	XXXXXXXXX	KKKKKKKK							:						•		
	23	ì	!	KXXXXX	XXXXXX	KXXXXX															
	•			CXXXX	(XXXX)	XXXX															
	0.0810			XXXXXXXX	KXXXXXXXX	KXXXXXXXX	××														
1000 HOURS	177 MA, IHUM	0.0116		HING HER HER HER HER HER HER HER HER HER HER	HINGE TO THE TERMS OF THE TERMS	. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXX	*											•		
10001	1 00000 U	STANDARD DEVIATION		*******************	*******************	**************************************	**************************************	******************	XXXXXXXXXX	XXXXXXXX	XXXXXX	XXXXX	×				• -			_	
5K	N W S	ST	:	×		_				χ,	×	ž	XXX.	×	XX.	_			_		
1B40	1925	0.0134		484	483	00\$	201	105	78	25	40	30	19	•	2	4	~	~	0		
SCS-301B405K	ZINIS	ö	COUNT	0.005	010.0	0.015	0.020	0.025	0.030	6.035	0.040	0.045	0.050	0.055	0,060	0.065	0.010	0.075	0.080	0.085	
S	NO OF DATA POINTS	MEAN VALUE	FROM 13	000-0	0.005	0.010	\$10.0	070*0	0.025	0.030	0.035	0.040	0.045	0.050	0.055	090.0	90.0	0.070	0.075	0.080	
===				_		-	_	-	_	_					_			_	- 1	5	

	1					,				-			·												•	-						
						,	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx																				•				1	
	i					,													:												:	
	:					,	?												•												•	
	٠.					,	<										- 2								;						:	
						į	Ì												•			,	,									
	_					,	Y Y Y						•												;							
	0.0001					3	Š																		1						ï	
	9					,	X																		ļ						,	
	;					;	Ž.												:													
	1					3	3												•		- 1			•	i							
	z,					2	X																		•						1	
	6 E O					,	Ž.												i												:	
	¥.					2	K																									
	1					1	X												,						;						1	
	<u>ب۔</u>		:	×		1	×												:						i							
	Š			ž			K K																									
	-			ž			×																		•						٠	
	_			ž			××																									
	00			ž			×												-						i							
	Õ.			×			×																		t							
	0.0007 # 657 MEDIAN			ž			×												1												•	
	;			×			×												:													
	_			ž			×																									
	Ş			×			×																								1	
	3 MAXIMUM			***************************************			×				J																					
Ś	I	70		ž			ž				*************																					
1000 HOURS	6	ĕ		×			×				×																					
Ō		Ö		ž			ž				ŝ																					
开		ı		×			×				×														٠							
00	•			ž			×				ž																				,	
70	00	S		X			ž				×																					
	8	1		×			×				ž																					
	Ö	DEVIATION		×			××				ž																					
		ē		×			×				×																		•			
				ž			XX				×				×																	
	3	OA		Ž			×				×				×		_	•	•	-												
	I	STANDARD		×			*XXXXXXX				******				******				××													
3.K	MUNINIM	S		٣,			•				•				•				•													
SCS-301C473K					^	_	. ^	_	_	0	~	_	0	_	۰,	O	_	٥	0	0	٥	0	~	0	0	0	0	0	0	0	0	_
Ü	1925	~		517	Ö	0	946	Ŭ	٠	0	303	_	Ŭ	_	-	_	0	_	70	٠	_	_	•	_	_	_	_	_	_	_	_	
	_	0.0001	_			_		_	_	_	_	_	_	_	_	0	_	٥	_	_	0	0	_	~	_	_	~1	_	_	~		_
()		o	COUNT	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	000.0	0.000	0.000	0-000	0.000	0.000	0.000	000.0	3.000	000.0	000.0	100.0	0.00	0.001	00.0	0.003	0.001	0.001	00.0	0-001	0.0
S	TS		Ō	•	ö	0	0	ò	•	ံ	o	•	ċ	0	ċ	ċ	Ċ	ં	ċ	Ċ	်	ċ	ċ	ó	ċ	င့်	ò	÷	ં	Ċ	Ö	ó
S	Z																															
	O OF DATA POINTS	5	10	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	~	_	_	_					_	سے			_
	A	MEAN VALUE		0.000	0.000	0.000	0.000	0.000	00000	0.000	00000	0.000	0.000	000	000.0	0.000	0.000	0.000	000000	0.00.0	0.000	0.000	000.0	0.00	0.001	0.001	0.001	0.031	0.001	0.001	0,001	.00
	Q	7	FROM	•	•	0	· •	5	Ċ.	0	٠ <u>.</u>	0	٠. د	0	ô	0	0	·	ت	3	0	3	ှံ	0	٠. د.	ò	.0	ં	ò	0	်	٠ 0
	Ç	ĒÀ	ď																													
	9	<u></u> ,								٠٠												,										
_			=		-		_	-	_	•		-	-	٠	-	-	_	7.8	_	-1	2	٠,	.1 - 15		٠		3		=	34,0	July 1	∓. ₫

- X X - X		1 ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '	: :	:
CXXXXX			,	:
D.0010 XXXXXXXXXXXXXX		; ;	:	:
X X X X X X X X X X X X X X X X X X X		; ;		
MEDIAN	į			1
818 XXXXX	1			
269 ** XXXXXXXX	·	i	;	i
1000 HOURS 0.0000 # 59 MAXIMUN 0.0259 # 879 MEDIAN 0.0010 RD DEVIATION 0.0014 KKXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		:	1	1 \ \ \ \ \ :
TH UNITED TO A CKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK		:	:	!
OURS 59 MAXIMUM 0.0014 KXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		:	,	
1000 HOURS 10 # 59 M 10 0.0014 (XKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK		1 :	:	· · · · · · · · · · · · · · · · · · ·
INTERNATION B. 59 STANDARD DEVIATION B. 59 **XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX				
**************************************				•
MINIMUM STANDA *XXXXX *XXXXX *XXXXX				
SCS-301C334K NTS 1925 HIN C.0013 ST 0.002 541 0.002 541 0.004 77 0.005 77	010000	7 V O C O O O M	50000000000000000000000000000000000000	26.55
SCS-3 (NTS 0.001) 0.003 0.004 0.005	0.007 0.007 0.008 0.008 0.010	0.015	0.019 0.020 0.021 0.022 0.023	0.026
SC. OF DATA POINTS FROM TO CO 0.000 0.001 0.000 0.000	0.005 0.006 0.007 0.008 0.008 0.010	0.013 0.014 0.015 0.018	0.018 0.039 0.020 0.021 0.022	0.024 0.024 0.025 0.025
0F DATA POREAN VALUE FROM TO 0.000 0.001 0.001 0.002 0.003	0000000	-157.		

DELTA CAPACITIES

1000 HOURS

SCS-301C105K

:	•				××	XXXXX	XXXXXXXXXX			-								i				
0.0024					<i>KKKKKKXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX</i>	. KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	<i>XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX</i>	*****	*****						•							
MEDIAN			CXXXXXXXX	CKXXXXXXXXX	CXXXXXXXXXXX	**********	(XXXXXXXXXXX	*********	**********	CXXXXX								!				
702			KXXXXX	KXXXXX	KKKKKI	XXXXXX	CXXXXXX	XXXXX)	XXXXXX	XXXXXX												
0.0099 # 702 MEDIAN			<i>hakakakakakakakakakakakakakakakakakakak</i>	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KXXXXXXXXXXX	XXXXXXXXXXXXXXX	XXXXXXXXXXXX	XXX HEXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	××											
124 HAXIMUM			CKXXXXXXXXX	KXXXXXXXXXXX	CXXXXXXXXXXX	CXXXXXXXXXX	KKKKKKKKKK	XXXXXXXXXXXX	KXXXXXXXXXX	(XXXXXXXXXX)	XXXXXXXXXXXXXXXXXXXXXXXXX	(XXX										
124	0.00		KXXXXX	XXXXXX	KXXXXX	XXXXXX	XXXXXX	KKXXXX	XXXXXX	KXXXXX	XXXXXX	XXXXXXXXXXX	ž									
# 0000°G	STANDARD DEVIATION		. XXXXXXXXXXXXXXXXXXXX	. * * * * * * * * * * * * * * * * * * *	*************	XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXX	***************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	*****************	XXXXXXXXXXXXXXXXXXXX	×								
RINIMOR	STANDARD		*XXXXXXX	*XXXXXXX	****	· XXXXXX	*XXXXXXX	*******	XXXXXXXX.	*XXXXXXX	******	XXXXXXXX*	******	****	××ו	* XXXX	×.	• -	•			
1925	652		171	176	227	9	253	203	205	163	103	ĵ.	5.7	54	01	12	•	0	0		0	•
	0.0025	COUNT	0.001	160.0	0.002	0.002	0.003	6.003	*nn*0	0.00	0.005	, 00° 0	900.0	900.0	100.0	0.007	0.008	O. 008	9.009	0.039	2, 619	
NO OF DATA POINTS	MFAN VALUE	FROW TO	0,000	0.001	00.00	0.002	0.002	6.00.0	60.0	9.00%	500.0	0 0 0 0	0.003	900.0	0, 00%	100.0	0.337	9.000	0.008	0,000	6.004	
Ş	_																	-	15	8	_	

301B104K	MEAN VALUE 0.0006 STANDARD DE		0.000 350	0.001 308	0.601 0.001 226 .XXXXXXX	6.001 183		_	56	0.002 32	27	0.002 10	~	0.002 0.003 2	0.603 , 0.003 3	0.003 0.003 1		0.004 0.004 1	0.004 0.004 0	0.004 0.004 0	0.604 0.005 0	0.005 0.005 0		0.005 0.005 0	
10,000 HOURS	0.0000 # 42 MAXIMUM VIATION 0.0005		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX	XXXXXXXXX	CXXXX																	
	\$ 00.00	XXXXXXXXX	XXXXXXXXX	KKKKKKKKK	XXXX																				
	1920	KXXXXXXX	KKKKKKK	XXXXXXXX																		-			
	MEDIAN	XXXXXXXXX	XXXXXX																						
	0.000\$	XXXXXXXXXXXXXXXXX																				-			•
_	· • ;	XXXXXXX					•										•								

DELTA CAPACITIES

																											•		
				XXXX																									
				x	XXXX										:														
-	-			KXXX	KXXX																								
			ï	KKKK	KXX																								
				KKKK	(XXX)																								
	0.0095			(XXX)	(XXX)	(XXX		•	•																				
	•			(XXX)	Š	(XXX)																			• •	•			
				(XXX)	(XXX)	(XXX)																		٠					
	MEDIAN			CXXXX	(XXX)	(XXX)																							
	E C			XXXX	XXXX	XXX																							
				KXXX	(XXX)	(XXX)																							
	·			(XXX)	(XXX)	(XXX)	_																						
	0			XXXX	XXX	XXXX	KXXX																				•		
	0.0510 # 677			XXXX	XXXX	XXXX	XXXX																						
	0			XXXX	XXXX	XXXX	XXXX							~		XXXX													
	I			XXXX	XXXX	XXXX	XXXX	×						XXXX	XXXX	XXXX													
	664 MAKINUM			XXXX	na ka	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX						X	*****************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX												
IRS	¥ K	0.0108		XXXX	XXXX	XXXX	KXXX	XXXX						XXXX	XXXX	XXXX	XXXX	×											
10,000 HOURS	499	0.0		XXXX	XXXX	XXXX	XXXX	XXXX	XXX			XXXX	×	XXXX	XXXX	XXXX	XXXX	XXXXXXXXXXXX	XX										
90	•			XXXX	XXXX	KXXX	XXXX	XXXX	XXXXXXXXXX			XXXXXXXXXXXXX	XXXXXXXXX	KXXX	XXXX	XXXX	KXXX	XXXX	XXXXXXXXXX										
0	0000	10N		CXXXX	CXXX	XXX	KXXXX	CXXX	CXXX	XXX	XXXXX	CXXX	(XXX)	CXXX	CXXX	CXXX	CXXXI	CKKK	CKKKI										
7	9.0	ITAT			(XXX)					CXXXI		(XXX)					XXXX	(XXX)											
		STANDARD DEVIA		KKXXXXXXXXXX	XXXXXXXXXXX	XXXXXXXXXXX	KXXXXXXXXXXX	*XXXXXXXXXXXX	**********	*XXXXXXXXXXXXXXX	**************************************	***********	*XXXXXXXXXXXXX	XXXXXXXXXXX	XXXXXXXXXXXXXXXX	***********	***************	**************************************	XXXXXXXXXXX	XX:									
	Ž	DAR		(XXX)	(XXX)	(XXX)	(XXX)	(XXX)	XXX	(XXX)	(XXX)	(XXX)	(XXX)	CXXX	CXXXX	(XXX)	XXX	(XXX)	(XXX)	XXXXXXXX	XXXXXXX								
	FININCE	STA?		· KX)	ž.	ž	XX.	· XX	XX.	XX.	XX.	××.	(XX	XX.	ξ×.	ίχχ.	××	XX.	XX.	XX.	· XX	××	×	×					
SCS-301B105K		_	: J	=	588	*	139	86	0	9	15	٦	49	011	901	-	96	75	29	27		•	7	•		0	7	0	_
181	1925	0.0133							_	•		_			_							_	_				_	_	
-30			COUNT	0.002	0.004	0.006	.000	0.010	0.012	0.014	910.0	0.018	0.020	0.022	0.024	0.026	0.028	0.030	0.032	0.034	0.036	0.038	0.040	0.042	0.044	0.046	0.048	0.050	.052
S C C	O OF DATA POINTS	4		J	0	J	J	J	J	J	0	3	J	9	9	9	J	•	9	J	J	0	0	0	0	9	0	0	J
	TAP	ALUE	2	00	202	40	90	90	01,	112	*1	91,	81,	120	122	124	97		30	32	34	36	38	9	42	44	46	48	50
	F 04	MEAN VALUE	FRON	00000	0.002	0.004	0.00	0.008	0.010	0.012	0.014	0.016	0.018	0.020	0.022	0.024	0.026	0.028	0.030	0.032	0.034	0.036	0.038	0.040	0.042	0.044	0.046	0.048	0.020
	0	H	بة.										•						•										

-160-

TABLE XXVI

MEDIAN 0.0320		annannannannannannannannannannannannann	£	•		•												
418	- XXXX	CXXXX	t															
•	XXXX	XXXX																
0.1820 # 418	-	*********	XXXXXXXXXXXXXXXX															
10,000 HOURS	**************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	XXXXXXXXXXXXXXXX	XXX		×	XXX	XXXXXXXXX								ı	
000	XXXX	XXXX	XXXX	XXXX	XXXXXXXXX	XXXXXX	XXXXXX	KKKKKKKKK	XXXX	XXXXXX								
10, 0.0000 DEVIATION				¥	XXXXXXXXXXXXXXXXX	****	KKXXKXXXX	KXXXXXXX		XXXXXXXXXXXXXXXXX	KXXXXXXX	****						
K INIMUM 0.00	******	***********	***************************************	XXXXXXX.	XXXXXXX.	XXXXXXX.	• XXXXXXXXXXXXXXXX	******************	************	XXXXXXX	* XXXXXXXXXXXXX	***********	*XXXXX	.xxxx	 ¥	×		
B4051	365	339	180	122	96	80	85	90	102	7.8	19	4.9	23	15	9	•	-	
301	COUNT 0.010	0.020	0.00	0.050	0.060	0.000	0.080	0.00	0.100	0.110	0.120	0.130	0-140	051.0	0.160	0.170	0.10	001
SCS	:	•	0	0	0	0	0	0	٥	0	0	0	0	0		0	0	•
ATA P VALUE	0.000	0.010	0.030	0.0.0	0.050	0.000	0.010	0.080	0.090	001.0	110	120	130	071	0.150	0.160	0.1.0	00.
SCS-	FROM	000	ó	o	ó	ં	ċ	•	ò	•	0.0	0.1	1.0	0:	•	•	•	•

			>	•			:																		'	
	ì		>	KKKKKKKKKKXXXXXXXXXXXXXXXXXXXXXXXXXXXX									,												,	
	}		*	Ì																						-
	:		>	<			:																			
	1		5	Ì			į																			
	j		>	ζ.			i						:						٠							
	1		,	~			1																		i	
	İ	•	>	Ý			1						:												•	
	6		,				:																		i	
	0.0003		,	Ž																					:	
	o.)	< <			ļ						,						1							
	1		1	Š			ì												•						;	
	!		;	X X									:						1							
	Ž		;	ž			!						:												•	
	<u>.</u>		;	ž																					1	
	¥;		;	XX			•						i						·						;	
	ł		1	XX			ì												i						1	
	₹,		1	X			!						i						1						i	
	إنة		;	×			1												ı						ï	
	•		1	X			!																		,	
	S			×			i						:						•						:	
	900	0.0004		×																						
	3			Ž			,																		:	
	ļ			×									;												•	
	;			X									:												:	
	=			ž																					i	
	Ĭ			×																					•	
Ŋ	AX.	_		×			X						į												:	
Σή Ο	•	90		Ž			ŝ																			
<u>5</u>	~	ŏ		×	×		×																		;	
Ξ.				××	ž	×	XXX	ž																		
ಕ್ಷ	•	-		×	ž	ž	×	ž											٠						Ċ	
10, 000 HOURS	_	_		×××	XXXXXXXXXX	X	×××	XXXXXXXXXX																	1	
_	0000	õ		×	ž	×	×	×											,						1	
	0.0	A		××	X	XX	XX	ž													:				1	
	U	5		X	ž	XX	XX	Ž																	1	
		<u>.</u>		×	×	X	×	×	_																	
	•	ARD		×××	×	XX	××	××	ŝ																	
		STANDARD DEVIATION		XXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXX								• •	, ,	•						,	
	Z	STA		×	×	×	××	××	ź,																	
S.	π	,		Ī	Ī																				:	
47	5			*	3.5	225	589	220	11	0	0	~	0	0	0	0	0	~	0	0	0	0	0	- -0	0	-
<u>ي</u>	1925	è		œ	7	7	~	~																		
30		0.0004	-	0	ဝွ	10	7	10	~	10	02	02	05	20	20	60	03	93	60	c O	\$0	70	40	50	40	05
Š	v		COUNT	00000	0.000	0.001	0.001	0.001	00.0	0.001	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.	0.003	0.004	C. 004	\$00°0	0.004	0.004	0.005
SCS-301C473K	Z		U	0	0	0	0	0	O	0	J	0	0	0	0	J	J	J	J	O	J	J	J	_	_	
	NO OF DATA POINTS	سِ	2																							
	•	MFAN VALUE	-	ŏ	90	0	ב	10	10	10	010	25	35	20	20	20	03	03	60	6	60	40	90	70	*0	ð
	20	; >	T	0.000	00000	00000	0.001	0.001	100.0	0.001	0.001	0.002	0.002	0.002	0.002	3.002	0.003	0.003	0.003	0.003	0.003	90000	0.094	0.004	0.004	0.004
	u	Ā	FROM	0	C	0	2	0	0	0	0	0	0	0	0	G	C	0	٦	C	د	c	0	O	0	J
	_	Ĭ	í.																	,	~					
· 0=	5.1																		_ 1	6	Z.	_				

		:		XXXXXXXX																						!
	0.0038		•	######################################																						
				XXXXXXXXXX	XXXXXX			: : :												i ! !				•		
	381			XXXXXXX	CXXXXXXX									:						: ! :						
	84 KAXIMUM 0.0225 # 381 MEDIAN			XXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXX		:		_	XXXXXXXXXX	KXXXXX		-												
JRS	KA XI MUM	32	•	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXX		XXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX														
10, 000 HOURS	94	0.0032		CXXXXXXX	CAXXXXXX	CXXXXXXX	KXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	CXXXXXXX	CXXXXXXX	XXXXXXX	XXX										•			
10,	0.0000	DEVIATION					XXXXXXXXX		_	-			_													
4K	HINININ	STANDARD DEVI		*XXXXXXXXXXXX	*********	*********	- XXXXXXXXXX	*********	**********	********	***********	**********	* XXXXXXXXXXX	*XXXXX			-								-	
1C33	1925	0.0043		403	268	193	130	76	149	163	205	189	96	56	7	_		0	0	0	~	-	0	0	c	~
SCS-301C334K		0.0	COUNT	0.001	0.002	0.003	0.004	0.005	900.0	0.007	0.008	0.009	0.010	0.011	0.012	0.013	0.014	0.015	0.016	0.017	0.018	610.0	0.020	0.021	0.022	0.023
	NO OF DATA POINTS	MEAN VALUE	FRC* TO	0.000	100.0	0.002	0.003	0.004	0.005	0. 006	0.367	0.008	600.0	C10.0	0.011	0.012	6.013	0.014	0.015	9:0.0	0.017	0.018	0.019	0.020	0.021	0.022
	Ş	4 .																	•	- 1	6	3 -	•			

÷600.0	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX				
MEDIAN	XXXXXXXX XXXXXXX			- - - - - - - - - - - - - - - - - -	
0.0561 # 1136	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	; ; ;		! :	
0.056	(XXXXXXXXX) (XXXXXXXXXXX)		; i :	, :	;
10,000 HOURS 50 # 14 MAXIMUM CN 0.0068	**************************************		; ; !	:	:
UIMUM 0-	**************************************	**************************************	:		
31C 1051 1925 M 1066		58 100 127 50 50 50	m 0000	000000	000
5-30	0.000	0.010 0.014 0.016 0.018 0.020 0.022	0.026 0.0328 0.0328 0.033	0.044 0.044 0.048 0.044 0.044	0.050 0.052 0.054 0.056 0.058
ATA PU! VALUE	20000000000000000000000000000000000000	0.00 0.010 0.010 0.010 0.010 0.010	0.024 0.026 0.028 0.030 0.032	0.036 0.038 0.040 0.042 0.042	8 40 00 00 00 00 00 00 00 00 00 00 00 00

3.8.4.1 Failure Rate for Polycarbonate Capacitors

Based on the test of 11,550 capacitors for 10,000 hours, the objective failure rate of .002% per 1K hours was achieved. The FR formula is:

$$\mathbf{FR} = \left(\frac{(\mathbf{F} + 1) \ 10^5}{\mathbf{Hu}}\right) \cdot \left(\mathbf{UC}\right)$$

Where:

FR = % per 1K hours

F = Total number of failures

Hu = Total unit hours

UC = Max upper confidence limit factor.

The achieved failure rate evidences the capability of metallized polycarbonate film capacitors to achieve the S reliability level of the MIL-STD-690 at .001% per 1K hours at 90% confidence level when 23,000 units are tested for 10,000 hours at 125°C at rated voltage DC with 0 failures demonstrated.

3.8.5 Conclusions

The testing of the Metallized Polycarbonate Film Capacitors
......
was considered completed with 0 failures at the end of the 10,000 hour
period.

3.8.6 Maintenance of Test Facilities

At the conclusion of the 10,000 hour test, the three (3) ovens and test racks were inspected to determine the extent of repair

required to prepare the ovens for the second 10,000 hour test program to be performed with Metallized Polysulfone Capacitors. It was determined that a number of connectors and terminal clips showed excessive degradation as a result of the 10,000 hours on voltage and exposure to 125°C.

These degraded parts were replaced and the oven thermostats were inspected for wear. It was believed that the existing condition of the controls was satisfactory for continuation of use in the second test program, and the oven chambers in general appeared to be in satisfactory condition.

PART 2

THE METALLIZED POLYSULFONE FILM CAPACITOR

3.9 Phases 1 and 2 Process Improvement, Test and Evaluation

The conditions or processes evaluated are as follows:

- (a) Quality of Metallized Polysulfone as Received
- (b) Shrinkage of Film
- (c) Heat Treatment of Capacitor Section
- (d) Removal of Entrapped Solvent
- (e) Burn-In.

3.9.1 Introduction

Polysulfone is a high temperature resin with thermal, chemical, and electrical properties that make it quite attractive as a capacitor dielectric material. Chemically, the polymer is a polyether with linkages that make the material highly resistant to hydrolysis and oxidation. The material is soluble in polar organic solvents, aromatic hydrocarbons, clorinated hydrocarbons, and ketones. The electrical properties of polysulfone are comparable to those for polycarbonate. The glass transition temperature is typically 190°C.

These properties suggest that polysulfone could replace and perhaps even improve upon polycarbonate as the film dielectric in a metallized capacitor. Since polysulfone is soluble in a variety of solvents, thin film could be made by the solvent casting as well as by the extrusion techniques. The relative chemical inertness along with the high temperature capabilities of polysulfone should combine to provide a dielectric with an inherently longer 125°C life expectancy since capacitor life is to a significant extent a function of the rate of chemical reactions within the dielectric system and of chemical degradation and dissociation.

The objective of the polysulfone portion of this Production Engineering Measure was a Metallized Polysulfone capacitor with a performance indicating a capability of 0.001% failure rate per 1000 hours at 90% confidence level when operated at rated voltage and 125°C; and an achievable FR of .002% for the 11,550 tested, for 10,000 hours with zero failures.

Table II lists the Phases for the Metallized Polysulfone evaluation and test program.

3.9.2 Quality of Film as Received - Phase 1

A comprehensive incoming inspection was performed on each roll of metallized polysulfone material received including measurements of width, thickness, margin, and metal thickness.

The 1/2" wide x 25 gauge and 1 3/4" wide x 50 gauge rolls were acceptable quality. The 1/2" x 50 gauge and the 1 3/4" x 25 gauge materials were rejected for thin metallization. The metal resistance was as high as 240% over the upper resistance limit for these rolls. All rejected material was returned to the domestic source for replacement. The replacement rolls of film were acceptable.

3.9.3 Polysulfone Film Shrinkage - Phase 1

Film shrinkage tests were performed at temperature ranging from 120° to 170°C in 10°C increments. Three inch lengths of 1 3/4" wide film of each thickness (25 gauge and 50 gauge) were suspended in a heated chamber for one hour at each temperature increment. No significant shrinkage was observed.

This result indicated that seconditions for heat treatment could be chosen to be within the shrinkage to temperature range and that insufficient or excessive shrinkage would not be a factor for concern.

3.9.4 Polysulfone Section Winding - Phase 1

A total of 600 metallized polysulfone capacitor sections were required for the process improvement evaluation phase as follows:

		No. Sec	tions
Part Number	Rating	Proposed	Actual
SCS-301B104K	0,10 mfd - 100 VDC	150	205
SCS-301B405K	4.0 mfd - 100 VDC	150	181
SCS-301C473K	0.047 mfd - 200 VDC	150	219
SCS-301~!05K	1.0 mfd - 200 VDC	150	136

The winding of the capacitor sections was completed with an average winding yield of 90%. The sections were inspected for physical dimensions, margin, variation, wrinkles, overall workmanship, and capacitance and were found to be satisfactory.

3.9.5 Heat Treatment of Sections - Phase 1

An effective section heat treatment could remove any moisture, entrapped solvent, and undesirable residuals as well as condition the capacitor section for mechanical and electrical stability. In order to perform the test matrix to determine the most effective heat treatment, at least 30 sections of each of the capacitor ratings wound for evaluation of process improvement were subjected to each of the following five heat treatments. A total of 775 units were tested.

- (a) Group 1 (155 units): Heat for 12 hours at 150°C in air
- (b) Group 2 (155 units): Heat for 24 hours at 150°C in air
- (c) Group 3 (155 units): Heat for 24 hours at 125°C in air followed by 24 hours at 150°C in air
- (d) Group 4 (155 units): Heat for 18 hours at 125°C under vacuum of less than 250 microns followed by 24 hours at 150°C in air

(e) Group 5 (155 units): Heat for 24 hours at 85°C in air followed by 24 hours at 125°C in air followed by 24 hours at 150°C at 150°C in air

3.9.6 Phases 1 and 2 - Electrical Test of Sections After Heat Treatment

After heat treatment, the polysulfone sections were tested for dielectric strength, capacitance, dissipation factor, and insulation resistance, all at 25°C. The test conditions and limits were as follows:

Dielectric Strength: 2x rated voltage

Capacitance: ±10% of nominal

Dissipation Factor: 0.30% maximum

Insulation Resistance: 500,000 megohms or 100,000

megohms x mfds minimum.

The section test results presented in Table XXVII showed an inordinately high number of 4 mfd - 100VDC sections with low insulation resistance. Since the tests were performed on uncased sections, the significance of this fact was questioned. The results did suggest that the quality of the metallized film used for the 4 mfd part was suspect.

3.9.7 Assembly

Those sections that failed the voltage test were discarded and the remainder of the parts that had received the heat treatment and suction test were completely assembled. Precautions were taken during all of the steps comprising the assembly operation to assure that the

TABLE XXVII

PHASES 1 AND 2 METALLIZED POLYSULFONE SECTION TEST RESULTS

Heat		Units	Low	High	Cap.	Voltage Test
Treatment	т	Tested	IR	DF	-	Failures
1 reatment	Type	Tested	<u> </u>	Dr_	Failures	railures
Group 1	SCS-301C473K	46	0	0	0	0
	SCS-301B104K	41	0	0	0	0
	SCS-301C105K	30	0	0	0	2
	SCS-301B405K	38	8	0	0	0
Group 2	SCS-301C475K	46	0	0	0	0
	SCS-301B104K	41	0	0	0	0
	SCS-301C105K	30	0	C	0	0
	SCS-301B405K	38	11	0	0	0
Group 3	SCS-301C473K	46	0	. 0	0	0
-	SCS-301B104K	41	0	0	0	0
	SCS-301C105K	30	0	1	0	0
	SCS-301B405K	38	15	2	0	0
Group 4	SCS-301C473K	46	0	1	0	5
-	SCS-301B104K	41	0	0	0	0
	SCS-301C105K	30	0	1	0	1
	SCS-301B405K	38	12	1	υ	0
Group 5	SCS-301C473K	46	0	0	0	0
-	SCS-301B104K	41	0	0	0	O
	SCS-301C105K	30	0	0	0	2
	SCS-301B405K	38	13	1	0	2

Note: These units were uncased capacitor sections only and were tested to finished capacitor requirements. The tests were performed at 25°C and are not intended to be indicative of final results.

metallized polysulfone parts were not subjected to contamination from external sources. Assembly proceeded as follows:

Metal solder was applied to the electrode ends of the capacitor section after which lead wires were attached. The next step in the assembly operation consisted of applying plastic insulating end caps to each end of the capacitor section. The capacitor section was then inserted into an electro-tinned brass tube. A compression glass header was threaded over the lead wire at each end of the capacitor section and was so a red to the case. The eyelet of one of the two compression glass headers was solder sealed. The next step in the operation consisted of filling the voids inside the assembly with a potting resin through the single remaining open eyelet.

The function of this potting resin was to provide shock and vibration resistance consistent with the requirements of MIL-C-39022. The one remaining open eyelet was solder sealed thus completing the operation. The entire lot of capacitors was given a 100% visual inspection and a seal test.

3.9.8 Production Burn-In - Phase 2

The burn-in adopted for the polysulfone capacitor portion of this Production Engineering Measure was identical to that adopted for the polycarbonate part, i.e., to subject the capacitors to 140% of rated voltage for 250 hours at 120°C.

The test capacitors were first subjected to pre burn-in dielectric strength test and electrical measurements. The rejects were removed and the remainder of the capacitors underwent the 250 hour production burn-in. Electrical measurements were again performed on the "burned in" parts. The criteria used to determine a failure were the requirements of MIL-C-39022 and SCS-301.

The results of the pre and post burn-in electrical measurements are summarized in Table XXVIII as a function of heat treatment.

There were no catastrophic failures during burn-in. There were no dielectric strength or capacitance failures either before or after burn-in. The total number of 25°C insulation resistance failures amounted to 6.1% of the capacitors tested.

3.9.9 Group A and B Inspection - Phase 2

After burn-in the capacitors were subjected to Group A inspection in accordance with Table XII of MIL-C-39022. Since the parameter rejects were not removed after burn-in, those same failures were recorded in the Group A testing.

All rejects were removed and the remainder of the parts underwent Group B inspection in accordance with Table XIII of MII.-C-39022. The inspection limits were:

TABLE XXVIII

PHASES I AND 2 SUMMARY OF POLYSULFONE BURN-IN RESULTS

		Pre Burn-	Pre Burn-In Failures	Post Burn-In Results	in Results
Heat Treatment	No. Units	Insulation Resistance	Dissipation Factor	Insulation Resistance	Dissipation Factor
Group 1	150	4' W	0	9	0
Group 2	150	: M	0	య	9
Group 3	149	2	0	S	
Group 4	142	æ	0	10	-
Group 5	146	-	0	m	0

Limits:

0.30% 5 x 10^5 megohms or 1×10^5 megohms x mfds min. 2 x rated voltage Nominal ±10% Insulation Resistance: Dielectric Strength: Dissipation Factor: Capacitance:

Dielectric Strength:

2x rated voltage

Capacitance:

±10% of original value

Dissipation Factor:

25°C

0.30% maximum

125°C

0.60% maximum

Insulation Res stance:

125°C

2 x 10³ megohms or

1 x 10³ megohms x mfds minimum.

Table XXIX summarized the Group B inspection results.

Only one catastrophic failure was recorded, and that from the heat treatment 5 group. The only group that exhibited zero failures was heat treatment 1.

3.9.10 Selection of Process Improvements

Heat treatment 1, the production burn-in, and subsequent electrical measurements combined to produce a capacitor lot completely free of rejects at Group B inspection testing. This indicated that all potential rejects were effectively screened from the lot prior to submission to lot acceptance testing. These process steps were made a part of the Metallized Polysulfone Capacitor Manufacturing Process.

Heat treatment 1 consisted of heating the capacitor sections for 12 hours at 150°C in air. The production burn-in conditions were 250 hours at 140% of rated voltage and 125°C.

The decision was made to proceed with the Phase 3 First Article tests using the modified process.

TABLE XXIX

PHASE 2

GROUP B INSPECTION OF METALLIZED POLYSULFONE CAPACITORS

Heat Treatment	Units Tested	+125°C IR Failures	+125°C DF Failures	Life Test Failures	Post Life Failures	Total Failures	
Group 1	140	0	0	0	0	0	
Group 2	133	0	3	0	1	4	
Group 3	141	0	2	0	3	5	
Group 4	128	1	1	0	7	9	
Group 5	142	1	2	1	2	6	

3. 10 Phase 3 - First Article Tests

With the completion of the Evaluation and Process Improvement

Phases, the Preproduction or First Article Test for Metallized

Polysulfone Capacitors was undertaken. This involved the manufacture of 256 capacitors in accordance with the modified Manufacturing Process followed by subjecting these capacitors to the Qualification Inspection electrical, mechanical, and environmental tests as outlined in Table IX of MIL-C-39022 and modified by SCS-301. The 256 capacitors were comprised of the following:

Part Number	Rating	No. Units
SCS-301B104K	0.10 mfd - 100 VDC	64
SCS-301B405K	4.0 mfd - 100 VDC	64
SCS-301C473K	0.047 mfd - 200 VDC	64
SCS-301C105K	1.0 mfd - 200 VDC	64

Descriptions of each of the test procedures and the test results are included in sections 3, 10, 1 through 3, 10, 5.

3. 10.1 Test Group I - 256 Units

VISUAL AND MECHANICAL EXAMINATION 4.6.1

All units were examined for type of materials, construction, physical dimensions, markings and external workmanship.

The units showed no evidence of damage and were properly marked. All dimensions were within the specified tolerances.

TEMPERATURE CYCLING 4.6.2

The capacitors were placed, from room temperature, into a chamber at -55°C +0 -3°C, and allowed to stabilize for a period of 30 mirutes. They were removed from the low temperature chamber after the 30 minute period, allowed to set at room temperature for a period of time from 10 to 15 minutes, and then placed in a high temperature chamber at +125°C +3 -0°C, and allowed to stabilize for a 30 minute period. The capacitors were then removed from the high temperature chamber and allowed to set at ambient temperature for a period of time from 10 to 15 minutes. This series of transfers constituted one cycle. This cycle was repeated five times.

At the conclusion of the test, the capacitors were allowed to stabilize at 25°C. No measurements were made before or after the cycling.

No vidual evidence of damage was observed,

SEAL TEST 4.6.3

The capacitors, while at room temperature, were immersed for a period of one minute in mineral oil maintained at a temperature of 125°C -0 +5°C. The capacitors were examined during and after the test for evidence of leakage of the impregnant or filling compound.

No visual evidence of leakage was observed.

DIELECTRIC WITHSTANDING VOLTAGE 4.6.4

A DC potential equal to 200% of rated voltage was connected from terminal to terminal for a period of one minute. This same potential was then connected from the case to the terminals for a period of one minute. At the conclusion of this test, the capacitors were visually examined for evidence of damage.

There was no momentary or intermittent arcing or other indication of breakdown. Also, there was no visual evidence of damage at the conclusion of the test.

CAPACITANCE 4.6.5

The capacitors with values of 1.0µF and less were connected to a General Radio, Model 1608A, Impedance Bridge, operating at a frequency of 1000 Hz ± 100 Hz with a limiting accuracy equal to or less than 0.05%. An external frequency of 60 Hz was applied to this same bridge for measurement of the 4.0µF capacitors. The capacitance was measured while the capacitors were at room ambient temperature.

All values were found to be within 10% of their rated nominal values.

DISSIPATION FACTOR 4.6.6

The dissipation factor of each capacitor was measured concurrently with capacitance.

All units were below the .3% maximum dissipation factor limit.

INSULATION RESISTANCE 4.6.7

The insulation resistance of the capacitors was measured at the rated DC voltage, utilizing a Keithley Model 610B Electrometer in conjunction with a Power Designs Model 2K10 Regulated Power Supply. The resistance from terminal to terminal at 25°C, the resistance from terminal to case at 25°C and the resistance from terminal to terminal at 125°C was measured. At the conclusion of the 125°C insulation resistance measurement the capacitors were removed from the temperature chamber.

All values were greater than the specified minimum requirements.

FLASHOVER 4.6.8

The capacitors were mounted, by their leads, in the test chamber and the pressure was reduced to .82 inches of mercury (equivalent to 80,000 feet). After the pressure had stabilized, a DC potential equal to 125% of the rated voltage was applied for a period of one minute between terminals and between each terminal and the case. After the conclusion of the electrical test, the pressure was returned to ambient and the capacitors were removed from the test chamber and visually examined for evidence of damage.

There was no evidence of momentary or intermittent arcing or other indication of breakdown during the tests. Also, there was no visible evidence of damage at the conclusion of the test.

3. 10.2 Test Group II - 24 Units

VIBRATION, HIGH FREQUENCY 4.6.9

The capacitors were encapsulated in a hard wax-like epoxy, the vibration transmissibility of which had previously been tested to 2000 Hz and found to be satisfactory. The capacitors were epoxied to 5" x 5" aluminum plates and the leads were supported by insulated solder terminals located approximately 1/2" from the seal end of the capacitors.

These plates were then forwarded to Continental Testing Laboratories, Inc. for vibration over the frequency range of 10-2000 Hz at an amplitude of .06" DA or 20 g/s, whichever, was the lesser. The frequency was varied at a logarithmic rate such that it took twenty minutes to traverse the frequency range of 10-2000-10 Hz.

The vibration was performed in two mutually perpendicular axes for four hours in each of the radial and axial planes for a total of eight nours. Throughout the test, a potential of 50% of the rated DC voltage was applied between the terminals of the capacitors. During the last cycle in each axis, the capacitors were monitored for any electrical discontinuities or shorts.

No opens or shorts were detected during the test.

SALT SPRAY 4.6.10

The specimens were mounted in an Associated Testing

Laboratories, Model SS-3-4, Salt Spray Chamber so that the longitudinal axis was approximately at a 15° angle from the vertical and parallel to the principle direction of horizontal flow of the fog through the chamber.

The chamber was programmed to operate at a temperature of 35°C +2 -3°F. A 20% salt solution was used to generate the fog and was applied for a period of 48 hours.

At the completion of the 48 hour period, the devices were removed from the chamber, and salt deposits were removed by washing them in running water at a temperature of less than 37.8°C. After a 24 hour drying period, the capacitors were visually examined for evidence of harmful corrosion and obliteration of markings.

At least 90% of all exposed metallic surfaces were protected by the finish and the markings remained legible.

IMMERSION 4, 6, 11

The capacitors were immersed for a period of one hour in a saturated solution of sodium chloride and water at a temperature of 65° +5 -0°C, followed by immersion in a bath consisting of a saturated

solution of sodium chloride and water at a temperature of 0° ±3°C for a period of one hour. This cycle was repeated five times.

At least four hours, and not more than twenty-four after the completion of the final cycle, the dielectric withstanding voltage and insulation resistance of the capacitor and the capacitor to its case was measured. Capacitance and dissipation factor valso measured at 25°C. The capacitors were then examined for harmful or extensive corrosion and obliteration of markings.

No discrepancies were noted.

3.10.3 Test Group III - 24 Units

SOLDERABILITY 4.6.12

Prior to the application of flux and solder, 50% of the capacitors were subjected to aging by immersion in a noncorrosive container of boiling, distilled water for a period of one hour. No aging was performed on the remaining capacitors.

The terminals of all the capacitors were then immersed in flux conforming to type W of specification MIL-F-14256 to within 1/8" of the capacitor body, at room ambient temperature, for a period of 5 to 10 seconds. The dross and burned flux was then skimmed from the surface of the molten solder. Following this the capacitor was installed in the capacitor dip machine and dipped into the solder at the

rate of $1 \pm 1/4$ " per second, with a dwell time at the required depth of $5 \pm 1/2$ seconds and withdrawn at the rate of $1 \pm 1/4$ " per second.

After the dipping process, the capacitor lead was allowed to cool in air and the process was performed on the other lead. The residue flux was removed from the terminations by dipping in isopropyl alcohol and cleaning with a soft cloth.

After the cleaning process, the surface of each lead was examined using a microscope with a 10 power magnification, for 95% coverage of a continuous new solder coat and checked that pinholes or voids were not concentrated in one area and did not exceed 5% of the total area.

The leads were found to be covered uniformly with a smooth bright film of solder, and there was no evidence of pinholes or concentration of voids in the solder coverage.

SHOCK, MEDIUM IMPACT 4.6.13

The capacitors were encapsulated in a hard wax-like epoxy, the transmissibility of which had previously been tested and found to be satisfactory. The encapsulated capacitors were attached to 5" x 5" aluminum plates and the leads were supported by insulated solder terminals located approximately 1/2" from the seal end of the capacitors.

These plates were then forwarded to Continental Testing Laboratories, Inc. for medium impact shock. The specimens were dropped a total of 18 times, 3 blows or 3 shocks in each of the 3 axes. The peak shock value indicated was 100 g's with a pulse duration of 6 ms. During the test, a DC potential equal to 50% of the rated voltage was applied between the terminals, and a time monitor (capable of detecting transients in excess of 0.5 msec) was connected to monitor the voltage across each capacitor in order to determine any electrical failures or indication of malfunctions during the shock test.

Following the application of the final shock, the capacitors were removed from the shock machine and visually examined for damage.

During the shock test there were no opens or shorts detected.

There was no evidence of fractures or other visible mechanical damage.

TEMPERATURE CYCLING 4.6.2

The capacitors were placed, from room temperature, into a chamber at -55°C +0 -3°C, and allowed to stabilize for a period of 30 minutes. They were removed from the low temperature chamber after the 30 minute period, allowed to set at room temperature for a period of time from 10 to 15 minutes, and then placed in a high

temperature chamber at +125°C +3 -0°C, and allowed to stabilize for a 30 minute period. The capacitors were then removed from the high temperature chamber and allowed to set at ambient temperature for a period of time from 10 to 15 minutes. This series of transfers constituted one cycle. This cycle was repeated five times.

At the conclusion of the test, the capacitors were allowed to stabilize at 25°C. No measurements were made before or after the cycling.

No visual evidence of damage was observed.

MOISTURE RESISTANCE 4.6.14

The capacitors were mounted by their normal mounting means and installed in a horizontal position in a moisture resistance chamber.

The specimens were then conditioned for twenty-four hours at 50°C with an uncontrolled humidity and subjected to ten continuous cycles of humidity environment consisting of a 2 1/2 hour rise to 65°C and stabilization at that temperature for three hours while maintaining 90 to 98% relative humidity. The temperature was then reduced over a 2 1/2 hour period to 25°C, while maintaining 80 to 98% relative humidity, and then again increased for the next 2 1/2 hours to 65°C, while maintaining a 90 to 98% relative humidity. The temperature was maintained at 65°C for three hours, while

maintaining 90 to 98% relative humidity, and then the chamber temperature was reduced to 25°C in 2 1/2 hours while maintaining 80 to 98% relative humidity.

The two alternations at high temperature occurred over a 16 hour period at the conclusion of which, the temperature was stabilized for a period of three hours. At the end of this period, the devices were subjected to a temperature of -10°C for a period of three hours. At the end of this three hour period, the devices were installed on a vibrator and vibrated for fifteen minutes at room ambient temperature with a sinewave acceleration having an amplitude of .06" DA and a frequency varying uniformly between 10 and 55 cycles per second. The frequency sweep from 10 to 55 and return to 10 cycles was traversed in approximately one minute.

During the two humidity-temperature cycles of the first six steps of all humidity cycles, a polarizing potential of 100 VDC was applied from terminal to terminal of one-half of the test samples, while no potential was applied to the remaining half.

After the final cycle, the capacitors were conditioned at 25°C -5° +10°C at a relative humidity of less than 80% for a period of between 22 and 24 hours. At this time the dielectric withstanding voltage and insulation resistance of the capacitor and the capacitor to its case was measured. Capacitance and dissipation factor were also measured at 25°C.

Concluding the electrical test, the capacitors were visually examined for evidence of extensive corrosion and obliteration of markings.

No discrepancies were noted.

3. 10. 4 Test Group IV - 48 Units

TERMINAL STRENGTH 4.6.15

The terminal strength test as specified in Method 211 of MIL-STD-202 was performed as follows:

Pull Test (Test Condition A) - The capacitor was clamped by one lead and a force of 4 1/2 pounds was applied to the other lead in the direction of the axes of the terminations for a period of 5 to 10 seconds.

Bind Test (Test Condition C) - The body of the capacitor was clamped in a fixture with a load of 2 1/2 pounds suspended at a point within 1/4 inch from the free end of the terminal. The body of the part was slowly inclined so as to bend the terminal through 90° and then return it to normal position with the entire action limited to one vertical plane. A bend through 90° and return to normal position is defined as one bend. Consecutive bends were in the same direction and the load was restricted so that

the bend started $3/32 \pm 1/32$ inch from the body of the component part. The rate of bending was approximately 3 seconds per bend in each direction.

Twist Test (Test Condition D) - The capacitor was clamped in a suitable fixture and each lead was bent to a 90° angle at a point 1/4" from the body of the capacitor, with a radius of bend approximately 1/32". The terminals were then clamped to within 3/64" ± 1/64" of the bend, and the body of the capacitor was rotated about the original axis of the bent terminals through 360° in alternating directions for three rotations at the rate of approximately five seconds per rotation.

At the conclusion of all testing, the capacitor and terminals were visually examined for signs of mechanical damage.

There was no evidence of mechanical damage, and all leads were intact at the conclusion of the test.

LOW TEMPERATURE AND CAPACITANCE CHANGE WITH TEMPERATURE 4.6.16

The capacitors were placed in a temperature chamber margin at -55 +0 -5°C and a DC potential equal to the rated voltage

was applied at this temperature for 48 ± 4 hours. At the conclusion of this 48 hour period, the capacitance was measured at low temperature, and the units were removed from the temperature chamber and allowed to stabilize at 25° ± 5°C where the capacitance was again measured.

The capacitors were then stabilized in a high temperature chamber at 125 ± 3 °C and the capacitance was again measured. The capacitors were returned to ambient temperature of 25° \pm 5°C, and the capacitance again measured.

The measurement of the capacitance at each of the temperatures consisted of two successive readings taken at five minute intervals to indicate that no change in capacitance had occurred.

At the conclusion of this test, the capacitors were visually examined for evidence of breakdown, arcing, open and short circuiting and other visible mechanical damage.

All capacitance changes from the value at 25°C to the low and high ambient temperature were found to be within the specified limits.

3. 10. 5 Test Group V . ---

LIFE TEST 4.6.18.1

LIFE (ACCELERATED) (60 Units)

The capacitors were subjected to a 2,000-0 hour life test at 125°C+4°C with an applied DC potential equal to 140% of the rated voltage.

LIFE (RATED) (100 Units)

The capacitors were subjected to a 2,000 $^{-0}_{+8}$ hour lift test at 125°C $^{-0}_{+4}$ °C with an applied DC potential equal to the rated voltage.

LIFE TEST PROCEDURES

a distance of approximately 1 1/4" from one another to insure adequate circulation. The voltage to each capacitor was applied through an individual current-limiting resistor determined by the formula:

R = \frac{0.025}{C}. Where C was the nominal capacitance in farads and R was the resistance in ohms not to exceed 2 megohms. The dissipation factor of each sample was measured at 125°C after 24, but not more than 48 hours from the start of the test, and also at a time during the last 48 hours of the test. During these measurements, the DC potential was removed from the capacitor terminals. At the conclusion of 250, 1000, and 2000 hour test periods, the capacitors were returned to ambient conditions where capacitance, dissipation factor, and insulation resistance were measured and recorded. After these measurements, the capacitors were visually examined for evidence of corrosion or mechanical damage.

At the conclusion of 2000 hours, there were defective units outside of the allowable rejects per Table IX of MIL-C-39022. The 'ife testing was repeated using capacitors made from the state-of-the-art

material and all measurements were found to be within the specified limits and no visual evidence of corrosion or mechanical damage was observed (see 3.10.6).

3, 10, 6 Discussion of Results

Inspection Groups I, II, III and IV of the preproduction tests conformed with the requirements of MIL-C-39022, Table IX.

Inspection Group V was not required to be performed.

Inspection Group VI samples completed the required 2000 hours of accelerated life test with very poor results. There were four dielectric breakdowns and eight low insulation resistance rejects. Failure analysis revealed that the rejects were random dielectric failures not related to any specific cause or processing discrepancy.

Discussions were held with the domestic Metallized Polysulione film supplier who confirmed that this weakness with the material had been observed by other users and was related to the resin and film processing techniques. In the interim, state-of-the-art improvements had resulted in a film improved both physically and electrically.

Permission was granted to repeat the Inspection Group VI life test with capacitors made from the improved quality film. The new capacitors, 40 pieces of each of the four ratings listed in Section 3, 10,

were subjected to quality assurance testing of Group I and were then the Group VI life test per paragraph 4.6.18.1 of MIL-C-39022. There were no failures in the 2000 hours of testing.

With the favorable conclusion of the life test section, the preproduction phase of the Production Engineering Measure was satisfactorily completed.

3.11 Phase 4 - Production Run of Metallized Polysulfone Capacitors

3.11. i Manufacture and Burn-In

The production run was manufactured using the detailed production process developed during the Process Improvement and First Article production phases of the Production Engineering Measure. Since the manufacturing facility in which the First Article and production run was fabricated was dedicated to the production of high quality hermetically sealed capacitors, the state-of-the-art in the production areas was such that all necessary and unique production equipment had previously been developed within the company. Therefore it was not necessary to design, develop, manufacture, or procure either special tooling or design, procure, or fabricate limited production equipment in the performance of this Production Engineering Measure.

The production run of 11,550 capacitors consisted of the following listed part numbers and quantities:

Part Number	Capacitance ±10%	Voltage Rating	Quantity
SCS-301B104K	0.10	160 V DC	1925
SCS-301B105K	1.0	100 VDC	1925
SCS-301B405K	4.0	100 V DC	1925
SCS-301C473K	0.047	200 VDC	1925
SCS-301C334K	0.33	200 VDC	1925
SCS-301C105K	1.0	200 V D C	1925

Manufacture of the entire production lot of 11,550 capacitors was completed with no special problems encountered and all were subjected to the burn-in consisting of the application of 140% of rated voltage for 250 hours at 125°C. The lot satisfactorily completed burn-in.

3. 11.2 Group A Tests and Preliminary Measurements

After burn-in the capacitors were subjected to the Group A tests specified in Table XII of MIL-C-39022. The entire lot met the requirements and limits of the Group A testing. See Table XX which is the applicable portion of Table XII of MIL-C-39022.

3. 11.3 Initial Capacitance and DF

Initial capacitance of each capacitor was recorded so that a delta C value could be established for each part at the 1000 hour and 10,000 hour measurement points. With a requirement for an acceptable part for test as nominal capacitance ±10%, the test results are listed in Table XXX for each part. All parts were mounted on test racks and placed into the test ovens to be tested for 10,000 hours (see Figures 13, 14, 15 and 16). Initial DF is shown in Table XXXI as delineated in 3, 11.6.

PRESENTATION SENTENTATION SENTE PHERECHE PHE MEDIAN 9011 # . The transport of the part of INITIAL CAPACITIES 0.1094 . The experimental TABLE XXX 245 KAXIMUM . Prankankankankankankankankan 0.0000 0 HOURS .. XXXXXXXXXXXXXXXXXXXX MINIMUM 0.0900 . NAKKKKKKKKKKK .XXXXXXXXX XXX SCS-301B104K £ 8 6.092 0.093 20.0 660.0 9 0.095 960.0 0.09 6 101 6.0 •09 1.03 .092 .94 3.096 8 .102 3.093 66 20 2007 0.098 6

.

INITIAL CAPACITIES

O OF DATA POINTS 1925 HINIMUM 0.9005 # 1647 HAXIMUM 1.0999 # 944 MEDIAN					
1647 MAXIMUM	0.0405				KKKKKKKKK
-					XXXX
1 0.9005	IND DEVIATION		5	KX XXXXXXXXXXXX	. BKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK
PERIN	STAND!		0.910 14 KXXXXX	XXXX:	XXXX
1925	9066		±	31	67
MINTS	o	COUNT	0.910	0.920	0.930
NO OF DATA PO	MEAN VALUE	FROM TO	0.400	016.0	0.920

0 HOURS

SCS-301B105K

HERKERKERKERKERKERKERKERKER

.050

.070 .000

010

990

000 . 520

0.980 000 .020 .030 040 .050 300

0.940 0.950 0.960 0.970 3.990 .010

.010

KKKKKKKKKKKKKKKKKKK

KKPKKKKKKKKKKKKKK

XXXXXXXXXXXX KXXXXXX

. KANNAN

INITIAL CAPACITIES

0 HOURS

SCS-3013405K

NIFW! 3.6050 # 1723 MAXI 4.3710 # 438 MEDIAK 3.9280	!				REN		XXXXX			n n n n n n n n n n n n n n n n n n n		nanananananananananananananananananana		henen henen	HENNING HENNIN	. NIKH BORKEHERERERERERERERERERERERERERERERERERER	
1 S	5		~4	•	•		•	•		ě.			•				
192	3.924.	-	IV	6	•	0	2	6	*	* 0	~	91 0	~	0 27	•	0 21	
STNIC		300	3.62	3.65	3.67	3.70	3.729	3.75(3.77	3.800	3.825	3.850	3.87	3.900	3.925	.3.950	
OF DATA POINTS	THE AID VALUE	2 35%	3.60	3.629	3.650	3.675	3.700	3.725	3.750	3.775	3.600	3.125	3.650	3.875	3.900	3.925	

.675

.025

330

1.375

. XXXXXXXX

INITIAL CAPACITIES

X	
173	
>	
5	
4	
S	
Ñ	
	Į

0 HOURS

-									nnan marahan m			n n n n n n n n n n n n n n n n n n n		XXXXXX															•	: : : : : : : : : : : : : : : : : : : :		•
0.0450		•				i .		•	XXXXXXXXXX			XXXXXXXXXX		XXXXXXXXXX																		
MEDIAN							A MARKARA PARA PARA PARA PARA PARA PARA PAR		KKKKKKKKKK			CKKKKKKKKK		MANA MANA MANA MANA MANA MANA MANA MANA			CKKKKKKKKK											ı				: -
0.0488 # 1686				!			. A A A A A A A A A A A A A A A A A A A		CXXXXXXXXXXXX		*******	*********		XXXXXXXXXX			HARRARARARARY TRANSMIRK KARKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK		***					: 								٠
0.0484		:					XXXXXXXXXXX		XXXXXXXXX		****************************	XXXXXXXXX		KKKKKKKKK		KXXX	XXXXXXXXX		**************************											•		
766 MAXINUM	0.0011						XXXXXXXXXX		XXXXXXXXX	,	XXXXXXXXXX	XXXXXXXXX		XXXXXXXXX		XXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXX		XXXXXXXXX			XXXXXX						:				i
•	2			XX		XXXXXXX	KXXXXXXXX	×	XXXXXXXXX		KXXXXXXXX	XXXXXXXX		XXXXXXXXX		KKKKKKKKK	KXXXXXXXX		KKKKKKKKK		XXXXXXX	XXXXXXXXXXXXXXX		XXXXX								
0.0429	STANDARD DEVIATION		. !	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK		XXXXXXXXXXXXXXXXXXXXXXXX	CKKKKKKKK	XXXXXXXXXXXXXXXX	KXXXXXXXX	XXXXXXXXXXXXX	FERNERARRER	CKKKKKKKKK	AXXXXXXXXXXXX	(XXXXXXXXXX	CX XX	*****	(XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		XXXXXXXXXXXXXXXXXX		FEKKKKKKKKKKK	*****************		. J. KKKKKKKKKKKK					•			
*		K.		. XXXXX	XXXXXX	. XXXXXX	XXXXX	XXXXX	XXXXXX	CXXXXX.	XXXXXX.	- XXXXX	. XXXXXX	XXXXXX.	XXXXXXXXX	. XXXXXX	SYXXXX.	*****	. YXXXXX	*XXXXX	KXXXXX	. YXXXXX	**	. J.KXXXX	X X X	. J. KKKKK	***		,			
1925	3.0452 NT	*	ا	**	7	59	169	**	242	37	. 33	528	7	212	52	_	191	×	125	71	4	82	-	\$\$	€	15	7		_	0	7	
STHIG	200	0.0+3	0.63	0.043	* 80.7	0.044	4+C-0	1.044	440-0-	0.045	0.045	0.045	540.0	0.045	0.046	0.046	940.0	940.0	940.0	0.047	0.047	1 * U * L	3.047	0.047	0.048	0.048	0.049	0.048	840.0	640.0	0.049	
۱,	FPON VALUE		6	T	1000	9.046	0.044	0.04	3.044	940.0	0.045	0.045	0.045	0.045	0.045	0.0.0	250.0	940.0	9000	0.046	0.047	2.00.0	0.047	230.0	3.247	0.04#	840°C	0.048	893.0	3.048	0.049	:

INITIAL CAPACITIES

K 0 HOURS	MINIMUM 0.2972 # 1613 MAXIMUM 0.3539 # 231 MEDIAM 0.3272	, i		Mary Company			M M M M M M M M M M M M M M M M M M M	CKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK			. Nanakarakaraka	. Henemenementenden en Martin		WHAT I	. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	. NATERKETEKEN NATERETEKEN NATERETEKEN SER EN SER ER BEREGER EN SER ER BEREGER ER SER	XX.		:		CHEKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK		ZKRKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK		THE THE THE THE THE THE THE THE THE THE	. XERRERXE		M M M M M M M M M M M M M M M M M M M	
C3341	1923	•	97	•	ç	! ~	ĸ	116	122	7	1	203	\$	549	•	137	278	~	202	~	.105	136	~	103	0	37	5 0	-	0
SCS-301C334K	OTHTS 0.3	COURT	0010	0.302	0.304	0.306	0.309	0.310	0.312	0.316	0.318	0.320	0.322	0.324	0.326	0.328	0.330	0.332	0.334	0.336	0.338	0.340	0.342	0.344	0.346	0,348	0.350	0.352	0.354
1,√ coV	53	FROM TO	0.298	0.300	0.302	0.304	0.306	0.308	0.310	0.354	0.316	0.318	0.320	5, 322	0.324	0.326	0.328	0.330	0.332	0.334	0.336	0.338	0.340	. 0.342	0.344	0.346	0.348	0.350	0.352

INITIAL CAPACITIES

	1.0965 6 953 MEDIAN 0.9730					nhananananan karanananan karanan KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	HYBEFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF	HERRIGHERHERKERKERKERKERKERKERKERKERKERKERKERKERKE	ahhhhhhhhhhhhhhhhhhhhhhhhhhhhhhhhhhhhh	ninenkkikikkikkikkikkikkikkikkikkikkikkikkik	nh hakarakakakakakakakakakakakakakakakakaka	I A XX X X X X X X X X X X X X X X X X X	XXXXXXXX										
C 0 HOURS	1925 MINIMUM D.9067 # 1926 MAKIMUM		XXX.	. HEKKEKKE	. NAKARAKAKAKAKAKAKAKAKAKAKAKAKAKAKA	. HHEHHEHHEHHEHHEHHEHHHHHHHHHHHHHHHHHHH	SAHAHAHAHAHAHAHAHAHAHAHAHAHAHAHAHAHAH	. HEEKEEKEEKEEKEEKEEKEEKEEKEEKEEKEEKEEKEEK	**************************************	**************************************	"XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	, AXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXX	, ARRENE	XXXXXXX	*:	ĸ	•	
2105F	925		9	23	82	170	205	224	214	210	205	121	122	109	89	4	5	•	70	80	*	~	
SCS-301C105K	0	COUNT	0.910	0.920	0.930	0.940	0.950	0.960	0.410	0.980	0.990	1.000	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100	
e de la constantina	NO OF DATA POINTS	ET ROAT	006.0	0.610	0.920	0.930	046.0	0.950	096.0	0.970	096.00	066.0	1.000	1.010	1.020	1.030	1.040	2.050	090.1	1.070	1.080	1,090	

3. '1.4 Computer Codes to Histograms

Capacities

Columns 1 and 2 - Capacity in microfarads

Column 3 - Number of units in the capacity range listed in columns 1 and 2

Computer X's - Relative display of column 3 numbers.

Delta Capacities

Columns 1 and 2 - Capacity deviation increments

Column 3 - Number of units in the increment listed in columns 1 and 2

Computer X's - Relative display of column 3 numbers

Total Quantity - The total of the number measured differs from the initial capacity total numbers on some histograms because the computer program did not itemize units exhibiting 0 capacity change.

Dissipation Factor

Columns 1 and 2 - Percent DF. Move decimal point 2 places to the left and read % in both histograms and listing

Column 3 - Number of units between the increments listed in columns 1 and 2

Computer X's - Relative display of column 3 numbers.

3, 11, 5 Initial Capacity Distribution

Table XXX presents a histogram of the initial capacity distribution. All parts were within limits.

3.11.6 Dissipation Factor Distribution

Table XXXI presents a histogram of the initial DF distribution. These data include a .6% bridge and associated recording interface error in addition to the initial .3% DF limit. All parts were within limits.

3. 11. 7 Test Implementation (See 3.8.3)

All parts were mounted on the test racks and placed into the ovens, numbers 1, 2 and 3, with the temperature set at 125°C.

Rated DC voltage was applied to the capacitors. Capacitor ratings and distribution within the ovens was as follows: 1925 each rating,

Oven Number	Nominal Capacity	Rated Voltage DC
1	0.10 µF	100
1	1.00 μF	100
2	0.047µF	200
2	0.33 µF	200
3	4.00 µF	100
3	1.00 µF	200

3. 11.8 1000 Hour Test Results

The initial capacitance and dissipation factor measurements, recorded prior to extended life test were analyzed for comparison to the capacitance and dissipation factor measurements recorded following completion of 1000 hours of extended life test. The analysis revealed one (1) failure in the 0.047µF - 200 VDC capacitors. All other units were within the limits prescribed by this contract.

The state of the s

INITIAL DF

1	ú	į	ì
1	8	ĺ	:
ì			
ĺ	۶		,
1	C	į)
1	Š	ř	١
•	۲	۲	ŀ
•	c		,
	_		
		4	
•		į	
3	9	ŗ	
٩)	
•		ŧ	
ť	٧	٠	
	٠	4	
•		•	
		•	
· ·	֡֡֡	:	
~ < <	7	1	
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		1000	
		4000	
2		1000	

		1	
		4	
		4.000	
10. U.C.		** > > > > > > > > > > > > > > > > > >	

INITIAL DF

0 HOURS

SCS-301B105K

																				×		
•	-						:						KXXXXX						KKKKK	KHYHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH		
	35.0000						•	•	•			KXXXXXX	HERETER EER EER EER EER EER EER EER EER E		CXXX		CXXXXX		n n n n n n n n n n n n n n n n n n n	I XXXXXXXXXXXXI		
	T MEDIAN				:							aaraakaakaka aakaaka ka ka ka ka ka ka ka k	XXXXXXXXXXXXX		aabakkakkkakkkkkkkkkkkkkkkkkkkkkkkkkkk		HAKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	I W M M M M M M M M M M M M M M M M M M	XXXXXXXXXXXXXXX	XXXXXXXXXXXXX		
	1 87						•					XXXX	XXXX	XX	XXXX		XXXX	XXXX	XXXX	KXXXX		
	55.0000 # 871				-							KXXXXXXXXXXX	KXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	****	KXXXXXXXX	KXXXXXXXXXXXX	. Kahananananan kananananan kananan ka	*****	KXXXXXXXXXXX	CX X	
	753 HAXI HUR	6261						!			IKKKKKKKKKKKKKKKKKK	KXXXXXXXXXX	XXXXXXXXXXXX	KXXXXXXXXXX	KKKKKKKKKK	XXXXXXXXXXXXXXXXXXXXXXXXXX	KKKKKKKKKK	K X X X X X X X X X X X X	KXXXXXXXXXXXXXX	KKKKKKKKK	***********************	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
	75	-									XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
	•	:								×	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	,
•	16.0000	DEVIATION								XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX		*****************	XXXXXXXXXXXXXXXX	********	. X X X X X X X X X X X X X X X X X X X	XXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXX	.XXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	*****
	1925 ATMINUM 10.0000	STANDARD					•	!	XXXXXXX	XXXXXXX	. XXXXXXX	XXXXXXX,	XXXXXXX	XXXXXXX.	XXXXXX	XXXXXXX.	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX	KKKKKK,	
i	1925	163			0	0	0	•	6	4 3	8	170	202	124	167	114	173	144	203	236	96	1
	POINTS	E 36.21	COUNT	10.000	12.000	14.000	16.009	18.000	20.000	22.000	24.000	26.000	28.000	30.000	32.030	34.000	36.000	38,000	40.000	42.000	44.000	
	OF DATA POINTS	EAN VALUE	PROM TO	000.8	10.000	12.000	14.000	16.000	18.000	20.000	22.000	24.000	26.000	28.000	30.000	32.000	34.000	34.000	38.000	000-0-	42.000	

XXXXXXXX XXXXXX. XXXXX

46.000

44.000

48.000 52.000 54.000

46.000 48.000 50.000 52.000

TABLE XXX

AT MERCHANIST CONTROL OF THE PROPERTY OF THE P

INITIAL DF

		The same of the sa														XXXXXXXXXXXXXXXXXX		•										•		•	•
	30.000	•				•							•			MHENTHER HENDER HE FELDER HET FER FELDER HER KERKEN FREKER HER HET FER FER FER FER FER FER FER FER FER FER	MANNA														
	949 PEDIAN												•		XXX	KKKKKKKKKKKK KK	XXXXXXXXXXXXXX	XXXXX					•						•		
	₱ 0000°09									į	i				XXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXXXXX											
0 HOURS	1 1207 HAXIMM	2914.5				:					•				annammelana anammenammenammen	IXXXXXXXXXXXXXXXX	. Nementer de le mande de le mande de la m	AKAMMAMMAMMAMMAMMAMMAMMAMMAMMAMM	IXXXXXXXXXXXXXXXX	NEW NEW NEW NEW NEW NEW NEW NEW NEW NEW	XXXXXXXXXXXXXXXXXX								•		
HO	7.0000	80 OE				:					•			* X X X X X X X X X X X X X X X X X X X	. Hankkanakankkanı	•	• X X X X X X X X X X X X X X X X X X X	. XXXXXXXXXXXXXXXXXXX	. Examination of the contraction	*******************	HXXXXXXX	***							:		•
\$05K	2			×				XX.	×	. XXX	×	XXX	XXX.	.XXX	XXX.	. XXX	.XXX	CXXX.	. XXX	. XXX	XXX	****	K K K	۲ •					:		
SCS-301B405K	1925	30 <u>-6</u> 021	•	Ò	۲ 0	-	•	•	•	0 10	0	*1 0	0 13	0 67	_	_			_		_	35	2 6	· •	` ~		0	٦ 0	0	0 -	•
SCS.	POINTS	8 8 8	2.000	4. 600	9.000	6.000	16.30	12.000	14.000	16.000	18.000	20.000	22.000	24.000	26.000	38.000	30.00	32.000	34.000	36.000	38.000	40.000	000*2*	\$6.00 \$6.00	49.000	20.000	52.000	24.000	\$6.000	58.000	>
	DOF DATA PO	PERS VALUE	0.000	2.00%	900.4	\$.000 \$	300.8	10.000	12.090	14.000	16.300	000-81	20.000	22.000	24.000	26.000	28.000	30.000	32.060	34.000	36.000	36.000	0000	000-44	46.000	48.600	50.000	52.000	54.000	56.000	>>>

and the second of the second s

TABLE XXX

INITIAL DE

¥
73
4
5
3
CS
Š

	-			1	•		X TAKKA KAKKA			:		:		:		;		,				1				•			!		•				1	
	7.0000	3			ZZXXXXXXXXX	INERNYNNINGENNYNNYNNYNNYNNNYNNNNNNNNNNNNNNNN	. Bene kenereken kenereken kenereken kenereken kenereken kenereken kenereken kenereken kenereken kenereken ken	ABBLEARE		,		•						i			XXXXXXXXX	•														
	MEDINA			XXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXX	XXXXXXXXXX										:			:XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			1							:				1	
	8061 8	•	•	XXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	****	KXXXXXXXXX	XXXXXXX	XXXXXXXX										• !	XXXXXXXXX												•			
	35.0000		XXXXXXX	XXXXXXXXXX	XXXXXXXXXXX	XXXXXXXXXX	XXXXXXXXX	XXXXXXXXXXX	*********	KKKKKKKKKK				!				;			XXXXXXXXXX	. ::									:		:			
Š	62 MAKIMUM	9.8040	H H H H H H H H H H H H H H H H H H H	nakalkanakanakanakanakanakanakanakanakan	indannnannannannannannnnnnnnnnnnnnnnnnn	(XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXX	CHANNAMANANA	I K K K K K K K K K K K K K K K K K K K	KAN KEKAKEKAKAKEKEKEKEKEKEKEKEKEKEKEKEKEKEK	CHRHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH	XXXXX								:	inabennininamentament an kannannamentamentamentamentamentamentamen	111111111111111111111111111111111111111				!									CXX	(XXX
C HOURS	0.0000	A I V 3C	_		XXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXX	XXXXXXXXXXXXXXX				XXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	ж	XXXXXXXXX	×						Ę.	XXXX	XXXX	XXXXXX	XXX	-		:			1	**	XXXX		XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
ኧ	M NI FILE	STANDARU	· XXXXXXXXXXXX	**************************************	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	CKXXXXXXXXXXXXX	. XXXXXXXX	XKKKKK Y	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	S RESERVANTANTS	************	CXXXXXXXXXXX	. XXXXXXXXXXXXX	***************		уя.	×.	×	******	AXXXXXXX.	· XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	BYXXXXXXXXX	**********	XXXXXXXXXXX	****	× ×	C 34		,	 	- XXXXX	************	. YXXXXXXXXX	**********	. TYXXXXXXXXXX	
10473	1924	371	93	13%	891	-114	202	160	114	-	7.2	19	38	36	8	9	4	-	15	5	163	54	24	52	7	د	٠ .	. ~	~		7	22	53	0.4	25	25
SCS-301/2473K	10	10.987	1.000	2.000	3.000	4.930	\$.000	0000	2.000	8.000	60006	70000	11.000	12.000	13.000	14.030	15.000	16.000	17,000	18.300	10.000	20.00	21.000	22.000	23.000	24.000	26.000	27.000	000762	24.000	000.01	31.000	32.000	33.300	_24.202_	35.000
	THICK POINT	READ VALUE	0000	1.000	2.000	3.300	4.000	5.000	6.003	7.000	\$.000	9.000	10.000	11.003	12.000	13.000	14.009	15.000	15.000	17.000	18.000	19.000	20.000	21.300	22.000	23.000		2000	27.000	28.500	29.300	30.000	31.000	32.300	33.000	34,000

INITIAL DF

	1740 MEDIAN 16.0000			i		•			_											•									٠	
1						:			KKKKKK	÷																	,		,	
	140							KKKKK	XXXXXXXXX	XXXXXX								•					•		-				•	
	_	,		٠			:	XXXXXX	KKKKK	CAAAAAA											:	i			•		!		•	
	9000 *65			•				ne ne ne ne ne ne ne ne ne ne ne ne ne n		arananan kananan >Kananan kananan * * * * * * * * * * * * * * * * * * *																,	! !			
	M4XI MCH 30+					•	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KKKKKKKKKKK	****	AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	*****										,						•	•		
HOUKS	4064.8			!			XXXXXXXX	XXXXXXX	XXXXXX	********	**	C 24	ł.									;							•	
O HC	DEVIATION						XXXXXXXXXX	HAKKKKKKK	XXXXXXXXXX	**************************************	***************************************	**********				×	XXXXX				;	: }					•			
¥	STANDARD DEVIATION			•	XX	. NEXECTER SEC	***************************************	. MXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KKKKKKKKKKK	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	**************************************		XXXXXX	;	XXX.	. HXXXXXXX	. NKKKKKKKKKKK		. KYYKK	×	×××	XXXX	×.			×	!			
1C334	1925	•	۰ ٦	P 149	12	57	155	283	9	295	100		31	•	18	7	\$	+ r	~~	=	19	22	~	~	-	~	~	*	*	
SCS-301C334K	21 MY 5 18.	7.00.4	000	9	8.000	10.000	12.000	14.000	16.000	18.000	22.000	24,000	26.000	28,000	30.000	35.000	34.000	35.000	000	42.000	44.000	46.000	48.000	\$0.000	\$2.000	54.000	56.000	58.000	60.000	
· ·	3	FROM TO		000	9.000	8.000	10.000	12.000	14,000	15,000	7000	22,000	24,000	26.000	28.000		32.000	34.000	38.000	40,000	42.000	44.000	46.000	000-84	20.000	52,000	24,000	26.000	000*85	

INITIAL DF

5K
Ö
ວ
50
ŵ
Ś
S_{C}
٧,

0 HOURS

40.0000												,			IXXXXXX	n n n n n n n n n n n n n n n n n n n	nkkakkakkakkakkakkakkakkakkakkakkakakakak	HENEMERKERENEMENEMERENEMERENEMERENEMENEMERENEMERENEMERENEMERENEMERENEMERENEMERENEMERENEMERENEMERENEMERENEMEREN						-				•		•	
MEDIAN										•					XXXXXX)	(XXXXXX)	(XXXXXX)	(XXXXXX)	(XXXXXX)												
1376				•							:				XXXXXX	XXXXX	KXXXXXX	XXXXXX	XXXXXX	ž								!			
00					•				•				XXXX		XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	×										
25.0000	;				!	XX	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	×			XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	***********************		<i>akkkakkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkk</i>	TXXXXXXXX	CXXXXXXXX	CKKKKKKK C	HAKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KKKAKKKKKKKKKKKKKKKKKKKKKKKKKK	A A A A A A A A A A A A A A A A A A A 									
21 HAKIMUM -7832					XXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXX	KXXXXXXX	KKKKKKK	****************	KXXXXX	XXXXXXXXXXXXXXXXXXXX	KXXXXXXX	KXXXXXXX	**********	KXXXXXXX	KXXXXXXXX	KXXXXXXX	KXXXXXXX	KXXXXXXX	CXXXXXXX	KXXXXXXX	KXXXXXXX	XXCXXXXXXXXXXXXXXX								
221 5.78					CXXXXXX	CXXXXXX	CXXXXXX	CXXXXXX	CXXXXXX	XXXXXXXXXXXXXXXXX	CXXXXXX	CXXXXXX	CXXXXXX	CXXXXXX	CXXXXXX	KXXXXXX	CXXXXXX	KKKKKK	CXXXXXX	CXXXXXX	KXXXXX	KXXXXXX	CXXXXXX	CXX				•			
* 88	•			XX	CXXXXX		KXXXXX	(XXXXX)	CXXXXXX	CXXXXXX	(XXXXX)	CXXXXX	(XXXXX)	(XXXXX)	CXXXXX	LXXXXX	(XXXXX)	(XXXXX)	(XXXXX)	(XXXXX)	(XXXXX)	(XXXXX)	XXXXXX	CKKKKKKK	LXXX						
25.000 DEVIATIO				XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	CXXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	AXXXXX	XXXXXX	XXXXXX	XXXXXX	KKKKKK	KXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX						
MINIMUM 25.000 Standard Deviation	ţ	××.	XXXXXXX.	XXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX		JKKKKKKKKKKKKKKKK	.XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXX	XXXXXXXXXXXXXX.	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	, x x x x x x x x x x x x x x x	***************************************	<i>_</i> XXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXX	*************	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	ZHXXXXXXXXXXXXXXXX	TRICKERKERKERKER		"(XXXXXXX	CKKK	(XXXXX	XXX	**	3 4.	·-
39.0473	-	₩	13	3	9	10	0	2	99	63	99	8	9	65	133	138	101	135	119	%	87	8	\$	43	33	•	71	•	•	~	•
OINTS 39.0	~	26.000	27.000	28.000	29.000	30.000	31.000	32.000	33.000	34.000	35.000	36.000	37.000	38.000	39.000	40.000	41.000	42.000	43.000	44.000	45.000	46.000	41.000	48.000	49.000	50.000	51.000	52.000	53.000	54.000	\$5.000
NO OF DATA POINTS REAM VALUE	8	25.000	26.000	27.000	28.000	29.000	30.000	31.000	32.000	33.000	34.000	35.000	36.000	37.000	38.000	39.000	000.04	41.000	42.000	43.000	44.000	45.000	46.000	47.000	48.000	49.000	20,000	\$1.000	22.000	. 53.000	24.000

The one failure that occurred after 1000 hours of extended life test was disassembled to determine the cause of failure. Electrical measurements showed the capacitor (P/N SCS-301C473K, 0.047µF - 200 VDC) to be an open circuit. Failure of the capacitor was attributed to internal pressure which ruptured the endseal causing separation of the lead wire from the section. The section was checked electrically and it remained within the contract limits. The internal pressure was judged to be mechanical generated by the 125°C temperature. It is believed that the modification of manufacturing controls on the section size would prevent a reoccurance of this failure mode.

3, 11, 8, 1 Capacities at 1000 Hours

Table XXXII presents a histogram of the capacity distribution at the 1000 hour readout.

3. 11. 9 Delta Capacities at 1000 Hours

Table XXXIII presents a histogram of the Delta Capacities.

The 1000 hour readout of capacity for each unit was compared with the initial capacity value read for that unit and the histogram derived from the percent capacity change for each unit. All parts (except 1) met the specified limits.

3, 11, 10 Capacities at Readout Intervals

Table XXXIV presents histograms of the capacity distribution and Delta C for 50 of each capacity value measured at 250, 2000, and 4000 hours, as applicable to ovens #1, #2 and #3 and the ratings therein

CAPACITIES

301B104K
.30 JE
SCS-

1000 HOURS

# 1106 MEDIAM 0.0973						KXXXXXXXXX		nykkananakananakanakanakanakanakanakanak	n n n n n n n n n n n n n n n n n n n	nnanananananananananananananananananan	n n nen nen nen nen nen nen nen nen nen	NAMANANANANANANANANANANANANANANANANANAN	KKKKKKK	KKKKKKKKKK		XXX						•
0.1084 # 1106	•					KKKKKKKK	KKKKKKKK	KKKKKKKK	KXXXXXXX	KKKKKKKKK	XXXXXXXX	KKKKKKKK	KKKKKKKK	KXXXXXXX	KKKKK	KKKKKKKK						
349 MAXIMUM					KKKKKKKKKKKKK	. Handanananananananananananananananananan	KKKKKKKKKKKKKKK	XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX	I K K K K K K K K K K K K K K K K K K K	_b xamanananananananananananananananananana	I K K K K K K K K K K K K K K K K K K K	"XXIII INKANAIINKIN KANAKKKKKKKKKKKKKKKKKKK	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXX				
0.0036	EVIATION				KKKKKKKKK	HEXXXXXXXX	XXXXXXXXXXX	KKKKKKKKK	I KKKKKKKKKK	XXXXXXXXXXX	KKKKKKKKKK		KKKKKKKKKK	XXXXXXXXXXX	:XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXX		XXX.			
FIREMEN	6.0976 STANDARD DEVIATION	(H.K.	"XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	CHARRARHARMAN	"XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	**************************************	**************************************	***************************************	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	*XXXXXXXXXXXXXXXXX	***************************************	SXKKKKKKK	***************************************	XXXXXXXXXXX	ZXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	*XXXXXXXXXXXX	XXXXX	¥×.	
1925	27.5		•	30	2	127	745	191	137	\$07	156	250	121	130	*	112	6	73	92	11	٠,	N
	0.0	COUNT	0.00	0.091	0.092	0.093	0.094	0.095	0.096	160.0	860.0	0.099	0.100	0.101	0.102	0.103	0.104	0.105	0.100	101.0	6.108	0.10
O OF DATA POINTS	HEAN VALUE	FROM TO	0.0	0.00	0.092	0.092	0.093	\$60.0	0.095	0.09	26000	860.0	0.099	0.100	101.0	201.0	601.0	0.104	0.105	90.0	0.107	0,108

A STATE OF THE PROPERTY OF THE

Ti.

CAPACITIES

X
B105K
30
- 1
SCS

1000 HOURS

** 6896 8 1647 MAXIMUM 1.0995 8 944 MEDIAM 0.9836	,							INGRESENSE SE Indries in company de	KRKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	menger and and and and and and and and and and	Inkranakanakanakanakanakanakanakakakakaka	(hemakanananakananananananananakananananana	Inkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkk		KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	CHANKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	THE SHEET SHEET SHEET SHEET SHEET SHEET SHEET SHEET SHEET SHEET SHEET SHEET SHEET SHEET SHEET SHEET SHEET SHEET	**************************************	M M M				
0				XXXXX	XKXXXX	XXXXX	XXXXX	XXXXX	XXXXX	KKKKKI	XKKK)	XXXXX	XXXXX	XXXXX	XXXX	KKKKK	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX		
MINUM 0.0896			×	NKHKKKKKKKKK	.XXXXXXXXXXXXXXX	ZXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	. NANKAKAKAKKKKK	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXX	ZXXXXXXXXXXXXXXXX		.XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	**************************************		************	CKKKKK	XXX
1925		l _{es}	87	5 *	2		116	120	136	111	193	182	161	170	109	106	73	23	0	33	*	13	• :
•	COUNT	0.130	0.400	0.910	0.920	6.930	0.40	0.990	0.960	0.970	0.980	0.440	1.000	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100
NO OF DATA POINTS	FROM TO	0.00	0.990	006.0	0.910	0.020	0.930	0.040	0.950	0,960	0.970	0000	056-0	1.000	1.010	1.020	. 00°1	1.040	1.050	1.060	1.070	1.060	1.090

CAPACITIES

¥
605 7
2
4
2
~
õ
Ú.
Ň
Q
SCS
-

in Arman a	SCS-	SCS-301B405K	05K 1000 HOURS
er bath points	Olurs	1925	MININUM 3.5868 8 1723 MAXIMUM 4.3400 & 438 MEDIAN 3.9200 STANDARD DEVIATION 0.1351
3.575	3 3 · ·	• <u>·</u>	The second secon
9.600	3.429		
3.625	3.650	6 t	
•	3.700	- 24	**************************************
3.700	3.725	5	
22.5	3.750	6 t	
S-1-2		` ~	• Nere erente er
3.400	3.825		
3.625	3.850	₩	
3.650	3.875		
W. 0.15		-	* HERE KERKERE KRIEKERE RIEKERE KRIEKERE KRIEKERE KRIEKERE KRIEKERE KRIEKERE KRIEKERE KRIEKERE KRIEKERE KRIEKERE KRIEKER KRIEKERE KRIEKERE KRIEKERE KRIEKERE KRIEKERE KRIEKERE KRIEKERE KRIEKERE KRIEKER KRIEKER KRIEKER KRIEKER KRIEKER KRIEKER KRIEKER KRIEKER KRIEKER KRIEKER KRIEKER K
000	.3.925		
276.75	3.450	\$13 0	- Free Christian
3.978	000.	214	. In the contract of the contr
9.00	4.025		
4.025	4.050	0 1 0	• Karanakanakanakanakanakanakanakanakanaka
	6.004	64.	
	4.100		
•	4, 150		
4.150	4.175		i Militaria de la compania del compania del compania de la compania del compania del compania de la compania del compania
•	4.200	110	KHHHHH
•	4.225	2	
•	4.256	# D	
4.250	4.275	~	
•	4.380	0	
4.300	4.325		
ć	ŕ	-	

CAPACITIES

URS	765 MAXIMUM 0.0489 # 1529 MEDIAN 0.0448						XXX	eraterenerkanderkerkerkerkerkerkerkerkerkerkerkerkerke	Meneralikan kan kan kan kan kan kan kan kan kan	TXXXXXX	<u>.</u> Karannakankankankankankankankankankankankan		T K K K K K K K K K K K K K K K K K K K		**************************************	X X X X X X X X X X X X X X X X X X X		THE PERSON NAMED IN COLUMN NAM								
1000 HOURS	MINIMUM 0.0426 #			XXXXXXXXXXX	XXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	, XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	. HEXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	XXXXXX	.XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	JARAHAKA Kemene	. A H BY H S H H K K K K K K K K K K K K K K K K	XXXXXXXX	, XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XX	EXXXXX	×					
73K	•			37	12	^! 2!	•	000						20 Y			•	2	60	 	64	•	9	0	,	_
•	247			43	ŧ,	0.044	٠						_				_	44	1+	46	48	48	9	6	49	9
301C4	c) Z			0	ó	3		0.045	0.0	0.043	0.049	0.046	0.046		Ç	0.047	0.047	0.0	0.048	0.048	0.048	0.046	0.049	0.049	070
SCS-301C473K	POINTS		0.043	0.043	0.043	ė	Φ,	-																		

THE SECTION OF THE SE

CAPACITIES

(7)	SCS-301C334K	C334	*	54UOH 0001	Suks Suks			7350	
NO OF DATA POINTS		8368	# [K [MUM D. 2867	0.2867	OSS MAXIMUM	0.3536 8 371	MEDIAM	0.3236	:
FEAN VALUE		0.3337 mt	TANDALD	DEVIATION	0.0127	-			
263	0	- -							
200	0.293	; • •••	:						
	0.295	· m	×	!	1				:
0.275	0.298	•	×	•				•	
0.298	0000	67	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	X	_				
0.303	0,303	2 %	. AEK . Xexxxxxxxxxxxxxx	XXXXXXXXX					:
0,305	0.306	2	. X K K K K K K K K K K K K K K K K K K		-				
0.300		129	- XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXX	CK KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	XXXXXXXX	:		:
_		2	. YPYKKKKKKK.						•
0.313	0.315	111	. KKKKKKKKKKKKKK		IN XIN XIN XIN XIN XIN XIN XIN XIN XIN X	XXX	:		
0.315	0.316	6	LYNKERKKKKKKKKKKKKK		. X X X X X X X X X X X X X X X X X X X				3
0.318	9.320	259	LAXXXXXXXXXXXXXXXXXXX		I K X X X X X X X X X X X X X X X X X X	I K K K K K K K K K K K K K K K K K K K	IKKKKKKKKKKK	n manamanan manamanaman manaman man Manaman manaman ma	XX::XX
0.320	0.323	21	. NHKKKKKKKKKK					3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	
0.323	6.225	241	"XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	: K K K K K K K K K K K K K J	CKKKKKKKKKKKKKK	CHRICHES NEW SERVICES	IXXXXXXXXXXXX	inderenterenterenterenterenterenterentere	
0.325	0.328	112	***************************************	(KKKKKKKKKK)	I A X X X X X X X X X X X X X X X X X X	CKKK		33 33 33 33 33 33 33 33 33 33 33 33 33	****
0.328	0.330		XXXXXXXXXXXXXXXX		CKKKKKKKKKKKKKK	KKKKKKKKKKKKK	******	indiningingingingingingingingingingingingin	*******
0.330	0.333	2	LNEXMERKE				3		
0.333	0.335		.XXXXXXXXXXXXXXX		IXXXXXX.XXXXXXXXX	. Karakarakarak. 	KAAA	•	
0.335	0.338	*	- XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KANKKKKKK		3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3			
0.336	0.346	134	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXX	(xaxanana anananana anananananana)	TXXXXXXXXX		:	
0.340	0.343	-1	.XXXXXX						
0.343	0.345	\$	XXXXXXXXXXXXXX	CKKKKKKKKKKKKKKK	×		-		
0.345	0.348	9	XXXX						
0.348	0.350	•	XX:						
0.350	0.353	~				•			
0.353	0.355	^	۲.		•	:			•
									•

-brrenternen THE EXPEREE HERE EX HENERGE EX SERVER . Saharanan karan REDIAN -bringerrengerrengerrengerrengerrengerrengerrengerrengerrengerengerrengerengerengerengerrengerengerrengerengerengerrengerengerengerrengengerengengerengengerengengerengengerenge 1.0899 TABLE XXXII CAPACITIES 1326 MAX[MUM 0-0342 1000 HOURS XXXXXXXXXXXXXXXXX HINIMIN 0.9035 STANDARD DEVIATION XXXXXXXXXXXXXXX XXXXXXXXXX -XXXXXXX SCS-301C105K 1925 .010 950 .030 3 .050 9 980 8 .020 .030 .010

DELTA CAPACITIES

	SCS-30) B104K	1B1041	×	1000 HOURS	OURS						:
	A BOTHTC	1926	MINIMA	0.0000	TO MAKINUM		0.0001 # 1460	1460	MEDIAN	0.0010	
MEAN VALUE		0.0011	1011 STANDARD DEVI	EVIATION	10000	:					
FROM	TO COUNT				7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	***					
0.00	00.0	1 301	***************************************		maxaakkakakakakakakakaka Telehinikakkakakak	KXXXXXXXXXX	IXXXXXXI	XXXXXXX	**************************************	erk crrkkarakarakarakarakkarakkarakkarakk	XXXX
	,	. ~	XXXXXXXXX	KKKKKKKKKKK	IN HERETHER HER HER HER HERETHER HER HER HER HER HER HER HER HER HER	HXXXXXXXX	XXXXXX	XXXXXX	LXXXXXX		
0		~	*XXXXXXXXXXX	(KKERKKKKKKKKK	(XX		-				
0.00	2 0.003	16 6	**************************************	IXXX						•	
0.003	9 6.00	28	. TXXXXXX								
0.00	0.00	•									
0.00	4.00.0	e e	-								:
40°0	200.0	%				-					
0.00	9.003	.	•	•	;			!			: :
\$00.0	3.00	7			•				•		
900.0	900.00	0		•							
0.00	00.0	0	•	- •							
A 0.007	700.0	~								•	
00.00	0.00	~	•								
00.0	0000	1	;		:		•	,		1	
800.0	800.0 0.009	-						•		•	
0.000		•	-		:	•	:				:
0.000	010.0	- ,									

	IN 0.0965 \$ 1490 MEDIAN 0.0041	AKKARKAKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	LAARAKAAAA		•					THE CAN WE SEE THE CASE OF THE SECOND							The second secon	
1000 HOURS	MINUM 0.0000 # 3 MAXIMUM PANDARD DEFINITION 0.0051	BERREARCH AND AND AND AND AND AND AND AND AND AND	edherdrekerkarakarakerakakakakakakakakakakakak					:					-					
8CS-301B105K	DINTS 1925	8130	0.010 574	28	0.025	0.030	0.035 2	0.040	0 540.0	0.050	0.055	0.060	0.065	0.070	00000	0.065	•	0.090 0.090

	SCS-301B405K	05K	1000	1000 HOURS					-
S OF GATA POSSTS	1925 0.0141	H IN I MUM ST AND AR	0.0000 0eviation	69 MAXIMUM 0.0270	6-3360 4	218	MEDTAN	0900-0	
0.000 0.000 0.010		. XXXXXXXX	(RXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	andernandernernandernandernernernernernernernernernernernernerne	HXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	(XXXXXXXX)	KXXXXXXXX	chery sherementer	X
0.00	4 W .	**************************************	***************************************	***			•	•	
0.050	0.060						•		
0000	0.670						•		
0.000	0,096	į							
0.000	0.100	;	:	•	•		: !!!!	1	i i
0.100	0.120				:	:	; ;		
0.120	0.130 2	-							
0.130	0.140			:					
0.150	0.160		:				•	•	
91.0	0.170			•			•		
0.19	0.190	:						•	
0.190	0.200	:				į			
0.219						,	•	•	
0.220							•		
0.240									
0.250	0.260				•		,		
	.280	!	•	•,		•	!		
0.280	0.290								,
0.30	0.316		•	-	,				
0.310	0.320				•				
6.330	0.340		-			:			

	SCS-301C473K	C4731	.	100	00 HOURS	7 0					•		-	
NEAR VALU	20	ر آني ا	MINIMUN 0.000 STANDARD DEVIATIO	0.0000 DEVIATION	8 H 0.0003	MAXINUM 003	0.0035	•	215	MED! AM	0.0004	-	- 1	
200.0 0.000.0	10 COUNT	355	***********		**************************************	************************	an kan kan kan kan kan kan kan kan kan k	XXXXX	CXXXXX	XXXXXXXXX	IXXXXXXXXX	. XX		
9	0.90		ZXXXXXXXXXXXXXX.		XXXXXXXX	KXXXXXXXX	***************************************	XXXX	(XXXXX)	XXXXX				1
000	0000	614	**************************************		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	annnnnnn noomannnn na kannannn kannan kannan kannan kannan kannan kannan kannan kannan kannan kannan kannan ka Kannan kannan	XXXX	KXXXXXX	XXXXXXXXX	I Y X X X X X X X X X X X X X X X X X X	KXXXXXXX	XXXXXX	Y X X
0.00	0.001	165			KKKKKKKK	XXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXX				•			
0.001	100.0	2	ZXXXXXXXXXXXXXXXX	IXXXXXXX										
6.001	0.001	3	"XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXX									٠	
2 6 6 6		\$ \$	**************************************	***										
100.0	100-0	•		***************************************				•			1			
100.0	0.00	~												
100.0	0.001	~												
100.0	0.001	~												
0.001	0.002	~	•											
0.002	0.002	~	•						:					
0.002	0.002	~												
0.002	200.0	~		•	•					•				
0.00	0.002	G,												
0.002	0.002	~			•	•	:							
0.002	0.00	0												
0.002	0.005	•	! !		1	: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1:	!			; ;	•		į	1
0.002	0.002	0												
200.0	0.002	(;											
7000	0000	o c												
0.003	0.003		ì .	. 1										
0.003	0.003	0												
0.003	0.003	-		•		: !	•							
0.003	0.003	•	!										•	
0.003	0.003	0		-										
0.003	0.003	0		:										
0.003	0.003	0												
0.003	0.033	0						1	•				;	
0.003	0.00	ο,												
0.00	0.004	>1		•					:					

К 1000 НСКІВБ ВТАВИКИ В 0.000 В 9 МАКЕМИ 0.0239 В 1486 МЕОГАИ 0.0028 ВТИЖИКИ КИКИКИ КИКИ КИКИ КИКИКИ КИКИКИ КИКИКИ КИКИКИ КИКИКИ КИК					1				:		•		<u>[</u>										XXXXXX	3 1 1					_
1000 HCUBS MUM											1				•		;						XXXXXXXX						
1000 HCCT BS WIN						,			•		•		!								•		XXXXXXXXXXXX		×	,	٠		***********
1000 HCCIRS ***********************************					:								:	٠			:						XXXXXXXXXXX		KXKXXXXXXXX			1026	
1000 HGC BB **********************************		•														:					٠		XXXXXXXXX	XXXXXX	XXXXXXXXX	KKKKK		9241	•
1000 HG 9 MAXEMUM **********************************														-		•							XXXXXXXXX	XXXXXXXX	(XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXX	•	0.0239	
1000 HCCI BE ***********************************												•							•		***********	***************************************	**********			XXXXXXXXXXX		MAXIMUM	
10 10 10 10 10 10 10 10 10 10						•										-					: X	XXXXXXXXXXX	***************************************	************	***	XXXXXXXXXXX		•	OO HOUBE
E WHICH HA				•				٠												KXX	×	KKKKKKKKK	KKKKKKKKK	XXXXXXXXX	CXXXXXXXXXX	7 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	ID DEVIATIO	0.00	7
MANAXXXXX		-	_		0	Δ,		_	_		.	_				•		×.	XX.	XXXX	XXXXX					•	l		¥
301C33 1028 1028 1028 1022 1033 1033 1033 1033 1033 1033 1033		۰	_	_	_	_	_	_	_	_	•			.	_	~	~	€	*	4	219	261	328	417	320		1027	1929	1033
300000000000000000000000000000000000000	;	0.024	0.023	0.022	0.021	0.020	0.014	0.018	0.017	910.0	0.015	*10.0	0.013	0.012	0.011	0.010	0.009	0.008	0.007	0.006	0.005	0.00€	0.003	0.002	0.001		ì	STMTS	SCS-30
SCS. FACTA VALUE FACTA VALUE FACTA VALUE C. O. O. O. O. O. O. O. O. O. O. O. O. O.	•	0.023	:	0.021	0.020	0.039	0.014	0.017	0.016	0.015	0.014	0.013	0.012	0.012	0.010	80.0	00:00	0.007	90000	0,009	9000	0.003	0.002	100-0	0,000		HEAN VALUE	A THE DATA DE	

•	1											1						1				
	0.0.31	•	XXXXXXXXXXX				•	•							-	٠				•		
	MEDIAM		RXXXXXXXXXXXXX																			
	0.0938 # 660 MEDIAM 0.0531	•	(XXXXXXXXXXXXXXX																			
	135 HAXIMUR	0400.0	MENNENNENNENNENNENNENNENNENNENNENNEN FREN FR	***************************************									:									
1000 HOUKS		DARD DEVIATION		XXXXXXXXXXXXXXX															i i		1 :	
×	A SERVE	T. AND ARD		'KXXXXX'	KKKKKK		į						ı			٠	•					
C105	1925	3	•	1676	153	2		9	2	~	•	~	•	•	•	∢ .	~	0	•			m,
SCS-301C105K	: - POINTS	0.0	C0214	8.8	0.010	0.015	0.020	0.025	0.030	0.035	0.00	0.045	0.050	0.055	0.060	0.065	0.070	0.075	0.080	0.085	0.090	0.095
S	MO OF 0414 PG	HEAM VALUE	FEET 10	0000	0.005	0.010	0.015	0.020	0.025	0.030	0.035	0.00	0.045	0.000	0.055	090.0	0.065	0.010	. 520.0	0.080	0.045	0.030
		Ц.						ene-	-		_	•			- 4	N. T	خاف		M	20	2	1

•
Ž
2
Ø
10
3
S
Ü
š

250 HOURS

064 g 43 MEDIAN 0.0969			•	ххиянини		**************************************	YKRKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK					CHIKKKKKKKKK				
# # # # # # # # # # # # # # # # # # #	* PANCOTO TO THE VIATION OF COONS	**************************************	MANAMAMAMAMAMAMAMAMAMAMAMAMAMAMAMAMAMAM	* INDERTENT TO THE TREET THE TREET TO THE TREETT THE TREET THE TRE	TOTAL CONTRACTOR OF THE PROPERTY OF THE PROPER	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	. ARKKANTAKARKKKKKKKKKKKKKKKKKKKKKKKKKKKKK			,	7777 H X X X X X X X X X X X X X X X X X			0 0
	0.047	7,000 0,000	1	1	 .	1			1 23 1 090	1	5.5	0 2010 1010	501.0 .01.	\$61.6 \(\clim{1.5}\)	\$01.0 .01.0 \$01.0 .01.0	361.0 A61.0

FINAL CA PACITIES

250 HOURS	
SCS-301B104K	

C. 0904 B 33 HAXIMIN 0.1029 6 43 MEDIAN 0.0959	0.0027		THE PROPERTY OF THE PROPERTY O		AXFXXXXXXXXXXX			**************************************				THANKING T	a alebrekereken kandan parken bandan parken bandan parken	. N N D D K K N N D K K K K K K K K K K K	A HAH HAH HAH HAH HAH HAH HAH HAH HAH H													
alida Malala	STAUFAD REVISTING		XXXXXXXXXXXXXXXXXXX		XXXXXXXXXXXXXXXXXX	***********		*************	**************	*****************	* XXXXXXXXXXXXX	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXX	*************	· X A X X X A X X A X X X X X X X X X X		AXXXXXXXXXXXX	* NYXXXX KKIAK	* KKKKKXXXXXX	XXVXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		XXXXXXXXXXXX.	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		. TAPARAXYYYY	XXXXXXXXXXXXXX	
50	8.3048		2 1	رح د	ار اد اد		3 0	7 .	1.5	<u>د</u>		5	4	£.	1 8	7	0	~ ·	-		-	c) Q	-1		0	1	-	
MATS	P	はいい	1000	2.392	7.052	7.047	0.193	1,003	470.0	0.094	, 00°C	0.325	الله الله	760°C	14.097	11000	1.799	G. OC.3	7.03	560°0	001.0	O. 1. C	TOT S	7.10	4000	11.192	2.13	
STATA PRINTS	TO A ATTIM	שנ שננג	7.42	1.0.0	1.00	1,00.93	10°0	1.943	1. (50°)	. Ann.	2. C.	9.0.6	470.0	7.)0,	, CO.	7: V.	11. 30.7	300°0	. 50 0	5.393		0.1.0	6.193	15147	16.1.0	2.10	46.20	

DELTA CAPACITIES

7 3.18	SCS.301B104K	Moto	250 H	O HOURS		,				÷
OF DATA PRINTS	INTS 50	PENINEM CS	0.0033	B MAXINUM	0.0079	=	PEOTAN	9.0000		* \
TO IND AND	0.0913	6.6513 SYAPOAFE DEVIATION	THE LANGE THE	0.3015	: - - -	:		:	!	
7.000	0.001	XXXXXXXX.	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	**************************************	***************************************	XXXXXX	***************************************	****		÷.
יייייר	0.001	İ	• XXXXXXXXXXXXXXXXX	an acana an an an an an an an an an an an an	KKKKKKKKKK	XXXXX	XXXXXXXXXXXXX	XXXXXXXXXXX	KXXXXXXXX	XXXXXXXX
0.001	3.401	XXXXAXAXXXXX								
1.00.	3.1.5	XYXXXXXX.	XYYXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX					•		
5.000	3.307	*XXXXXXXXXXXXX	KKKK							•
.00	0.0)2	. XXXXXXXXXXXX	XXXX				-			

XXXXXX

. KKKVVK.

TABLE XXXIV

INITIAL CAPACITIES

	•										(nd) quy na and quy nd nd y na an an an an an an an an an an an an							•				
	4EDIAN 0.9799				LEXXXXXXXXXXXXXXX	•	XXX				CHENERAL MERCHEN SERVICE											
	1.0930 # 46	- - -			. A NA NA MANA KANANANANANANANANANANANANANANANANANA		KARAKARAKKAAKKAKAKKKK KAKKKKKKKKK		INNXXXXXXX		*******************					:						
0 HOURS	# 2 MAXTYUM	7.0421	XXXXX	KHKKKKKKKKKKKKKKKK			~	**************************************	KKXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	KXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KKKKKKKKKKKKKKKKKK	REELE	*****		CA CA CACA CACA CACA CACA CACA CACA CA			•			
35K 25(-	STREET DE VIATION	KANANKERKA KANKA HANKA	. HUX CHANGE HANGE HANGE HANGE	*******************************	**************************************	SKAKKKKKKKKKKKKKKK	**************************************	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	* KKKKKAKKY CANYXXKAKKK	**************************************	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	* HEXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**********	******************	i .	•••		***********	**************************************	
SCS-301B105K	50	0.9812	0.926	0.010	0.940	0.950 3	0.96.0	0.970	0.030	0.000	1.000 R	1.013	1.0.20 2	2 01.0.1	1.3%0	J. 150 3	1.960 3	1.070 0	Ceu-1	1 (0)	1.100	
第四条线	STHING ATEC	34 VAL 135	0.0.0	3.973	7.015	09000	0.050	C. 48 ° C	1.971	. CL0.0	C,C,2	£ 1.000	610.1	0.6.1	1.13.	C · T ·	650.1	C + C - 3	1.17	(1.7.1)	1.000	• .

MEDIAN Herengy Lexanners and experience and INITIAL CAPACITIES 1.0930 TABLE XXXIV RREFERENTATIONS CONTRACTOR CONTRAC **TERMANES CHINERAN CHINES CONTRACTOR CONTRACTOR** KEKKIKK KEKKKI KEKKKIKK KEKKKIKK KEKKIKK K 250 HOURS 0,9130 MATERIAL CHAINE XXXXXXXXXXXXX TIN WIT SCS-301B165K 0.9812 3.6 اوي 010 080 0.350 0.970 3.0 Con 100 0000 000 0.40 20.0

FINAL CAPACITIES

					:		•			are de la comunication de la com	****							-			
-							: !				\ \ \ \ \ \ \										
2		;	į				•														
	6-6763					•				XXXXXX											
	2						•			KKKKKK			;								
•	NEGOTA				XXXXX		XXXXX			KKKKK									•		
	4	!			XXXXXX		XXXXXX			KXXXXX									!		
				XXXX	KKKKK		XXXXXX		K X X X	XXXXX		XXXX									:
	1.0678	:		CXXXXX	(XXXXX)		(XXXXXX)		KKKKKY	CKXXXXX		(XXXXX)							!		
	2			IKKEKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	HENERAL STATES S	XXXX	HANNANDENE HANDENE HANDENE HANDE HAN	XXXX	Y HY HAND FANDA CHAN FARKKKKKKAKAKK	XXXXXX		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	į	XXXX			•		•		
so.	MAX		-	XXXXXX	XXXXXX	XXXXXX	AKKKKK	FXXXXX	KKKXXX	KKKKKK		XAXXXX		KKKKK					1		;
250 HOURS	13	4140.0	XXXX	XXXXX	KXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	AVKAXX	W X X X K	KYXX	CKXXXX	XXX	Y X X X X X X X X X X X X X X X X X X X	XXX					CXXX	
720]	1 4 4 1		XXXXXXXXXX	KKKKKK	XXXXX	KXXXXX	XYXXXX	SXXXXX	KXXXX	KYKKKK	XXXXXXXXXXXX	(XXXXX)	KYXXXXXXXX	CXXXXX	HKKKKKKKK		:		:	(XXXXX)	
	10.0	TOTA T	-	-	-	-		•	_	-	-	XXXXXX	~	×			XX		: :	KNYKLKKA KAKAKAKA KKKKKKK	ı
	E	Standen Keth	RYXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	AKKKKKKKKKKKK	KANKAXXXXXXXXX	XXXXXXXXXXXXXX	HXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KXXXXXXXXXXXXXX	XXXXXXXXXXXXXXX	XXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX	Kananahananahar)	FXKKKKHKKKKKK	H X X X X X X X X X X X X X X X		KKKKKKKKKKK		•	XXXXX	!
COK	MINIMIN CS	24.16	. KYX	XXX	XXX	XXX	XXX	. XXX	XXX.	· XXX	NA TO	. XXX	XXX	XXX	XXX.		XX.		i	. XXX	
NCD-301B105K	53	1.4795	~ 	4		•	-	•	*	**	-	4	~	~	_	C	_	0	0	2	
3		2	354.0	0.935	0.0	2.5	0.56.0	0.410	05-6-11	0.400	1.030	1.013	1.526	0.030	1.040	1.750	1.36.	1.070	ا مادوا	1.353	
•	HE DATA POTOTS	14 AF	01	Ç.	30	3	40	20	10	·	6	000	-	0	610	740	13	2	6	-	
كطب	שב ניו	A DUA A	016.0	02000	1.930	7.963	1. 446	10.040	43.00	0.984	00000	5		1.0	-		1,747	1.060	1.47.3		-

IJ DELTA CAPACITIES 0.0100 TABLE XXXIV KANNAKANANAKANAKANAKANAKANAKANAKA 250 HOURS SYNWART DEVIATION . XXXXXX . XXXXXX XXXXXX SCS-301B105K 3.3.3R 9.912 3000 0.00 0.411 316. 0.002 0.010 3.063 3.001 DATA PRINTS

INITIAL CAPACITIES

	SCS-301B405K	340		250 HOURS	εχ.						
STATE POLITICAL TO CO.	- H	9	8841 STAMPAGE BEVEATION	3-6660 # 19 "AXIMUM VIATION 0-1022	4AX14UP	. 	0440	•	37	4.0970 # 37 MEDIAN	*
3.460	1.000 1	-	HENNERS OF THE PROPERTY OF THE					•			•
2.740	(C) (O \$ 1 * 5 * 5 * 5 * 5 * 5 * 5 * 5 * 5 * 5 *	اً ر		****			!	1	:		

. A THE TERESTERS AND THE SERVICE OF

* N LA L'HEN L'HEN L'HEN HEN HEN LEK L'HEN

Ş

£4.

28.0

(7.7.

50 C .. S. 6360 .037 . 020 980

. 120 . 260 Cec 430 000 CA?

4327

. Hen førken frekkerken frekkeren frekkeren frekkeren frekker frekkeren frekkeren frekkeren skar skar skar skar 3.8840 * Hereing en experenter experenter experter expe MEDIAN DINARRENCE AND DESCRIPTION OF STREET FINAL CAPACITIES TABLE XXXIV . The ex in expert experter experter experter experience experienc * HENERGY KENERGY KAN HENERGY 250 HOURS STANDART DE VIATION XXXXXXXXXXXX . XYXXXYXXXX . TTXXXXXXXX SCS-301B405K 140 3.0

6.00

.026

TABLE XXX

VALUE COLUMN		e	Name of Street		•	21 4AX	MAXI MU4	0.0343	-	62	VEDIAN	· •	3.3040	-		
				3										•	!	•
1	CO. 0. 0777	1	STAPDART DEVIA		Ö	.0045		:			i	1	:			
•	1000	-	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		XXXXX	XXXXX	CHEEN HANNESS HEREN HER HEREN HEREN HEREN HEREN HEREN	XXXXXX		3	2	*****	, , , , , , , , , ,	****		
L 301	0.002	œ	"XXYXXXXXXXXXX"	FYKKYKKKKK	XXXXX	XXXX	****	ペポススメスカメンソドストリンドストリンドメアストリンドリンドリンドリンドリンドリンドリンドリンドリンドリンドリンドリンドリンドリ	. K K K K	****	****	~~~~~~	CXXXXXXXX	XXXXXX	KXXXX	XXXX
1000	0000	•	***********	XXXXXXXXXXXX	XXXX	XXXX	KXXXXXX	XXXXXXXXXXX 	K K K K	***	****	*******	CHEXXXXX	XXXXX	KKKKKK	XXXX
F 0.04	400.0	•	XAXXXXX*	**************************************	XXXX	XXXX	KKYKKKK	XXXXXXXXXXXX 		· · · · · · · · · · · · · · · · · · ·	, , , , , , , , , , , , , , , , , , , ,				!	,
400	0.035	^	*XXXXXXXXXXXXX	XXXXXXXXXXXX	XXXXX	XXXX	*****	KEKKKKKKKKKKK FKKKK FKKKKKKKKKKKKKKKKKK	****	¥¥	•					
3.35	966.6	_	***********	XXX											:	
5.036	100.0	10		-												
. 307	0.00 C	-	*********	***								•	•			
800°	0.000	0														
600.	010.0	^,	**************	XXXXXXXXXXXXXXXX	×××	٠	٠.						:			
	3.911	-	*XXXXXXXXXX	XXXX												
1107	3.312	0	,	-	٠			,								
210	0.013	•	•													
د اد»	411.0	つ	- •		-	:	:		•							
4-7	,10°0	0	•													
£ : 5	2.016	c	; !	•						1		•		:	·	
910-	B-317															
1.017	0.01	c į								•				•		•
110.	010.0	n ·	,									•				
G.	0.070	c ;		-												
22:	0.021	 (. 42224242	HHH			•								1	
) V I	KINDANA CANADA	EXXXXXXXXXXXX	XXXX	XXXXX	XXXXXXXX	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	KXXXX	XXX					· }	
	464	-	KANAAKKAA						,							
7,7	0.025	1 - 4 1	**********	XXX												
-026	n. 124	0														
,	1.127	 	XXXXXXXXXXX	,	•					•						
, در ،	7.72A	C,	•	•		• •	?			1	:		•			•
2.44	960.0	0 (
		ب ع ;					,									,
	0,033	C (
~	210.0	က <u>်</u>									,	i				
225	ر در الم الم	o c											;		•	1
- 4		+	VEYVY CYNERY	ARRA L		1					i					
ŧ		⊸.		< < < < < < < < < < < < < < < < < < <												

INITIAL CAPACITIES

250 HOURS

SCS-301C473K

		•		! !		- 2-1-	- 1				XXXXXXXXX			-		
	: : :	• • •		XXXXXX	! •	-				- 1	XXXXXXXXX					
0.0453	•			 XXXXXX			1				HANN NE STANKANTEN KAN NA STANKAN KAN KAN KAN KAN KAN KAN KAN KAN KA		•			
0.0478 # 33 MEDIAN	:	:	**************************************	:		:	•			_	XXXXXXXXXXX					
33	!		XXXX	*		XXXXX				XXXXX	XXXXX				XXXXX	KXXXXX
•	:	:	XXX	CKKK		KKKK				XXXX	XXXX				XXXX	XXXX
0.0478		:		XXXXXXX	*	XXXXXXXX	:			(XXXXXXXX)	CKXXXXXXX			 -	KKKXXXXX	CXXXXXXXX
MAX Tull	0.0011	i - - -	*********	CXXXXXXXXX	TANKAKA TANKAKA TANKAKA					I K K K K K K K K K K K K K K K K K K K	KXXXXXXXXXX		!		KKYYKKYKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	IN NOTES IN THE SECOND
50,	9.08	 	XXXX	XXXXX	AKYXXXXXXX	XXXXX		KKXXXXXXX		XXXXX	XXXXX			!	XXXXX	XXXXX
ė.			I KK XX	KKKK	XXXX	XXXX		XXXX		XXXX	XXXX			!	XXXX	
0.0434	SYAMIZED DEVIATION	XXXXXX	**************************************	**************************************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	. * * * * * * * * * * * * * * * * * * *	XXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX	-	**** *******************	. HYXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			AMANANAMAN	************	PKKAKUTEEKKKKKKKKK
aff in in 05	SYLVINERI	• XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	******	AXXXXX.	XXXXXXX.	**************************************	***********	XXXXXXX.		· XXXXXX	. XXXXXX	-	*XXXXXXXXXXXXX	XXXXXXX	SAXKAXK.	PXXXXX
50	*	- 0	- •	r, c	۸,		-	?	0	•	~	0	-	-	4	•
1475	0.0454 CINUMT	0.043	0.044	3.344	2.045	0.00 U	3.045	1,045	0.046	0.046	3000	3.064	9.046	7.067	2.047	0.0.7
F SATA POINTS	TOTA NE	0.041	0.044	5.044	7.344	3,0,6	0.015	2000	3.145	0. JAK	94h	, U45	0.06F		1,041	15.047

FINAL CAPACITIES

3%	٠
-	
4	
Ų	
-	
0	
100	
•	
Ø	
U	
ď.	

250 HOURS

IN 0.0477 8 33 MEDIAN 0.0453		The same of the sa				(AXX)	<u>aranganganganganganganganganganganganganga</u>		nga ngananganganganganganangan nananganganangangangangangangangangangan			(XXX		NATE KARAKININ KARAKININ KARAKININ KARAKIN KARAKIN KARAKIN KARAKIN KARAKIN KARAKIN KARAKIN KARAKIN KARAKIN KARA		XXXX	•BXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX					A A A K K K K K K K K K K K K K K K K K				
HOW THE STATE OF	2100.0					CKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	*****		XXXXXXXXXXXXXXX	KKKKKKKKK		KAKAKKKKKKKKKKKKKKKKKK		HEXXXXXXXXXXXXX		MHXXXX ANAAAXXAAXXXXXXXX	KYKKKKKKKKK		. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	1	KKKKKKKKK	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		:		
0.0432	STEWSELP BEVIEW 104		XXXXX	XXXX	KKKKKI	KKKKKKKKKKKKKKKKKKKKK	KKXXXXXXXXXXXXXXXXX	XVXXX	AVXXXXXXXXXXXXXXXXXX	*XXXXXXXXXXXXXXXXXXXXX	KKKK	KKKKKKKKKKKKKKKK KK		**************************************		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	:XXXXXXXXXXXX		KXXXXXXXXXXXXX		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	***********	•			*****
MININIS	STEUDET		*********	*XXXXXXXXXXXXXXX	KKAKKYK.	XXXXXX.	XXXXXX	X TAXXXXXXXXXX	. AYXXXX	* YXXXXX	*XXXXXXXXXXXX	ZXXXXX.	: :	CKXXXXX	: :	CKEVER .	KKKKKK.	. 	XXXXXX		XXXXX	CX Y X X X X	:			337/333/33/3
. £	283			-4		٣	۲.	~	Z	~	-	m	e	÷	0	~	30	~	-	¢	-	ď	e	0	٦	•
Pritts	0.0452	5	F 96 3	5.043	0.044	440.0	3.854	0.044	9.146	0.044	0.145	13.045	546°C	0.745	3.0	3.046	3.55	340.00	1:10	140.0	0.347	7.047	0.047	0.047	3,10	
100 NATE PO	FEW VAINTE		1.343	0.643	1,0,1	440	3.0.0	3.064	***	0.354	1,245	0.005	240.0	3,0%	3,045	7,9,7,42	1.00.	0.046	3.76/	10.00F	74.5	V 30 . 7	7.047	2400	7.6	,

)		
ď	į	
7	i	
_	•	
ſ		
	i	
•	Ċ	
	j	
_	•	
-	ł	

	SCS-301C473K	104	73K	25	250 HOUKS	UKS									
PATER PRINTS	212	50	אואואוש סימטטי	0.0000	₽,	12 MAXIMIN	6.0023			MEDIAN	0.0001	1 4	`	••	·
ALU	0.00		SYSUNECE	REDIVIOR	9	+000									
C.	LAGOL		1		1	经现代的股外的股外的股外的股外的股票的股票的股票的股票的股票的现在分词,是是一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一	***************************************	2	24.44	*********	XXXXXXXXX	XXXXXXXXXX	(XXXXX)	XXXX	XXX
in.	0000	62	. XXXXXXXXX		KXXXX	*****	****	ζ ζ							
ני	0.000	7	*****		ı	3	!	:							
ocu	0.030		******		× × × × ×	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	-								
[F4.0.4	0.000	4	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXX					1	1		1			•
1	150.0	0													
inc.	100.0	0		1			į	:	,		-				
.371	0.501		XXX.												
. 16	100.0	-	XXX				1	:		:			•		
11.0	100.0		××ו												-
1.7.1	3.341	c							1			•			
=	100,0	c													
160.	100.0	٥			1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1	1	:::::::::::::::::::::::::::::::::::::::	:					
1000	160.0	0													
100	2000	ا۰			+	1	:		•	:					
- 1.	7:00	c													
. 117.3	, 102	9					:	;	,						
600.	0.302	c	•												
۲, ۲, ۲	200.0	0		: : : : : : : : : : : : : : : : : : : :				i		:					
0.00	0.00	0			٠						•				
ניני	0.10?	С		1 1 1 1 1			: !								
20.00	7.002	Ċ												٠	
-013	9.002	c							•		-		•		

INITIAL CAPACITIES

· .		;											XXX																	
		1						!					H H H H H H H H H H H H H H H H H H H																	
;													XXXXXX			•										•				
		-		:!									YXXXX																	
	272	•						•					KXXXXX		_		×								•					
	0.3272			•									XXXXX		XXXXX		XXXXX								XXXXX					
	7			: !				·					(KXXXX)		XXXXX		CXXXXX								XXXX					
	MEDIAN												XXXXX		*XXXX		XXXXX			XXXX					XXXXX					
	-	•		:								•	XXXXXX		XXXXX		XXXXX			XXXXX					XXXXX					
:	•	ļ		i •				!				i	(XXXX)	:	CXXXX		XXXXX	XYX		KKKKK				•	XXXXX	•				
:	0.3526 #			•				:		•			XXXXX		XXXXX		XXXXX	XXXX		***					XXXXX					
	•			1				-		ا ا		:	KKXKX	ì	XXXXX		KKKKK	XXXXXX		XXXXXX					CYXXX	!				
	*5.1					:				XXXXXX		:	XXXXX	 	XXXXX	:	XXXXX	XXXXX		XXXXX					YXXXX	į				! !
IRS	3 ~AX	5.0116		!						XXXXXXXXXXXXXXXXXXX		!	KXXXXX	1	*#####################################		MAKKAN KAN PAKA KAN PAKA PAKA KAN KAN PAKA KAN KAN KAN KAN KAN KAN KAN KAN KAN	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX					KKAKKAKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK					
50 HOURS	36					Į	XXXXX			XXXXXX			XXXXXX		XXXXX		XXXXX	XXXXX		XXXXX		XXXXXXXXX			XXXXX	!				
250	* 600	150				ļ	. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			CXXXXX		1	KKKKA	i 	CKXXXX	:	CXXXXX	XXXXXX		OXXX					KKKKK	j		-		
	0.3009	CHICKLEST REVIEWS		XXX		:	KXXXX			******		XXX	KXXXXX	HAYKYXXXXX	XXXXX	i 1	. XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXX		Y CKXXAXXAXXXXXXX	×××	XXXXXXXXXXXXXXXXX	XXX	-	HARKANAN CHAKKAAK	i	XXX	X 7 X		XXX
	Ł	3 21 45	,	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		:	XXXXX			XXXXX		XXXXXXXXXXXXX	XXXXX	XXXXX	XXXXX		(FEKKK	XXXXX		XXXXX	*****	XXXXX	XXXXXXXXXXX		XXXXX	:	**********	EKKAD PARKANK		Kantankukar
4K	# 1 × 1 × 1 ×	5		KXXX.		; ; }	. XXXX			.XXXX		KKKK.	. XXXX	KYY.	* XXX	!	. XXX	XXXX		XXXX.	***	. XXXX	XXXA.		XYYX.		* XXX	XXXX		. (x)
1033	50	2		_	c	0	~	6	c	*	0	_	ø,	-	ند	٥	ç	-	0	_	-	~	~	6	•	c	_			
SCS-301C334K		0.3779	COUNT	668.0	0.304	n. 306	2.308	0.310	. 112	0.314	0.216	0.313	7.30	1.32/	0.324	3,5	0.326	0.4	. 3:32	2	34.5	138	.343	1.342	* * *	1,01	3.8	J. 157), 354
ふ	PUINT		זט כי	Ċ	•	٥	د	5	ď	C	÷ .	ح ا	۲	<u>۔</u>	ċ	c	c	,-	۲.		÷	•۔	~	•	•		, <u>:</u>	÷ 	ָרָ ֖֖֖֖֭֭֭֭֓֞֝֓֞֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֡֓֓֡֓֓֡֓֓֡֓֓֓֡֓	~
	TATA POTAT	ATTO A STATE		300	3.872	30.06	£	0.171	01. 10	A. 31.3	. 314	115		10	.123	,	477		33.	1	335		3 4.5	140	674.	,	7.7.			
·	ŗ	12.4	#L34	-	2	. ¬	_	[-	K L	_		٢	6			ا		7			<u>.</u>	,	e L	^	1	,			^ .

FINAL CAPACITIES

2	Ş
۴	•
f	י
-	1
ç	, י
	١
Ľ	;
ũ)

250 HOURS

1					!			I A A A K K K K K K K K K K K K K K K K																	
0.3266		,						XXXXXXXXXXXXXXXXXX			•	XXXX													
19 MEDIAN	: !					:	•	XXXXXXXXXXXXXXXXXX	-			****								XXXXXXXXX		-		!	
0.3524 #	: :	-						XXXXXXXXXXXXX		XXX		XXXXXXXXXXXXXX	XXX		XXXXXXXXXXXXX	-		!		XXXXXXXXXXXXXX		-			
35 MAXIMUM	0.0111							KXXXXXXXXXXXX		INAXXXXXXXXXXXXXXXXXXXXX		<u>XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX</u>	HENKYKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	!	**************************************				:	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		:			
0.3062		*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			*****************		****************	XXXXXXXXXXXXXX	•	XXXXXXXXXXXXXXXXXXXXXXXX		* YAKKYXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KKKKKKKKKKKKKKKKKK	•	XXXXXXXXXXXXX	;	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XX		. XXXXXXXXXXXXXXXXXXXXXX	* 4		XX		¥ A.
MINIME	STAWALD	.XXXXXXX	. XXXXXXXXXX		*XXXXXX		KXXXXXX.	WXXXXXX.		XXXXXXX.	ARLYXXXXXX.	XXXXXXX.	XXXXXXX.		. X KX KX K		. XXXXXXX	XXXXXXXXX.		XXXXXXX.	*XXXXXXXX		****		XXXXXXXXX
\$ 0	*	~	-	0	۲.	P	۲.	2	0	4		-	•	0	ď	-	~	-	9	۰	-	c	••	0	-
SINIC	COMMI	0.308	0.310	51r.0	7.714	414.6	0.318	3.12	0.322	1.324	7.326	825.G	0.330	0.332	23.334	11.1	3.348	7.345	0.342	1) . 344	.) . 346	0.359	0.350	1.352	354 *1:
TE DATA PRINTS	FAPI VALUE	3.376	0. 1 JH	0.315	0.11.2	0.314	`* 41°		. (41.6	7,272	0. 17¢	2000	3, 174	0.330	3.343		2.5.0	35.0	0.340	1.347	3.344	0.045	7.14.	3.17.	77.

. m. 54	SCS-301C334X	103	34X	250 1	250 HOURS		;	1	4000		1,4.5
SANICA BASC A		53	414141 0.000J	0.000.0	MINIX VA B	0.0220	1 2 10 10 10 10 10 10 10 10 10 10 10 10 10	200			
Se Walth	0. A.11.2	L.	SYAFILARD	DEVIATIO"	1500-0					3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	****
בשיטת לים	ことと			To distant also designed to	THE TAXABLE AND THE COLOR OF THE PARTY AND T	XXXXXXXXXXXXX	XXXXXX	KKKKKKKKKKKK	ZKKKKKKKKKKK	XXXXXXXXX	
3.33	3.531		TAXXXXXX.	XXXXXXXXXXXX	***************************************						
100.0	0.002	~	XXXX	100000000000000000000000000000000000000							
200°C	(60°0	2	******	•	*****			:			:
0.003	0.034	0					:				
2.00.	0.005	c	i								
3.015	3,008	c		:	1						
0.00%	0.00	C									
. 100.1	0.c3e	c			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1						
1000°C	5.00.5	0								•	
0.309	01.0	င									
10.0	3.011	O						:	•	:	
0.011	0.012	C			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				-		-
0.015	10.0	c	_					:		ţ	
5.313	\$30° G	c	-				•				
410.0	13.036	0				•	;	:	:	: ;	
1.16	91:0	c	-				l				
410.0	0.017	0				-	!			•	,
. J.017	3.018	•									
7	ele.c	0	-						•		
010.0	0.020	0	: ::::			• • • • • • •		•			
77:30	3.021	c	;				!			t .	•
0.01	3.023	1	· XX								

INITIAL CAPACITIES

	250 HOURS
	SCS-355C 105K

		. !			•		KAN KAN KAN KAN KAN KAN KAN KAN KAN KAN			•			:
3.9793	: : :	÷ .		:			XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXX					
MEDIAN				:			XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	*****		•			-
33				:		XXXXX	N X X X X X X X X X X X X X X X X X X X	XXXX		!			
•				!		XXXX	XXXX	KXXX		1			:
1.0372	: 1	: :	•	CXX	c x x	KKKKKKK KK	********	******	×		CXX		:
Alla IXVa et #	A.0255	1		<u> </u>		. OT CONTROL OF THE STATE OF TH	AKKENKENKENKENKENKENKENKENKENKENKENKENKEN	KARRAKUTAKKAKAN KAKARKAKKAKAKAKAKKKKKKKKKKKKKKKK	KKKYYYXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		Hanah kamanananan mananan ka	•	
*	<u> </u> - 	•	XXXX	XXXXX	XXXXX	XXXX	****	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXX	l I	***		İ
3, 9287	POTATOR	XXXX	XXXXXXX	XXXXXXXX	(× >	**************************************	******		-	XXXXX	_	× × ×	N M M M M
So minimum	STANGARD MENTATON	-XXXXXXXXXXXXXXXX	**************************************	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	CPCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	**************************************	***************************************	**************************************	**************************************	**************************************	MNAKATATANAM.	***************************************	KANAKAKAKA.
3.	96		~ 0	ļ	6.4	. 	k ~	 - -	m 0		r c	۲ -	-
MYS	0.9796 COMT	0.035	0.945	A. 050	0.700	0.970	0.035	. 660.0 J.994	1.000	1.333	C20.1	1.036	8.047
S SATA BRINES	William Street	0.930	0.953	7.50	\$55°C	0.470	3.330	3.790	1.31	319°1 -	5000	1000	1.017

FINAL CAPACITIES

	- - 	an er ann er distillingsbetall en elle antimoster en en					· designed de la companyate designed designed for a la de-					KKKKKKKKKKKKKKKK		CHRHHHHHHHHH		•	•						•		
	0.9777					. 1					RXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		KXXXXXXXXXXXXX	KXXXXXXXXXXXXXX				•			•		i :	
	MEDIAN						! !		XXXXXXXX		HARKAKKK	XXXXXXXXXX	XXXXXXXX	XXXXXXXXXX	XXXXXXXXXX						•				
	1.0339 # 30		!		•		!		XXXXXX		XXXXXX	XXXXXX	XXXXXX	KKKKKK	XXXXXX						:		:	1)
	*		į		:		CXX		CXXXX		CXXXX	CXXXX	CXXXX	CXXXX	XXXX				İ			•	;		
-	1.033						(XXXXXXX)		XXXXXXXX		KXXXXXXX	KXXXXXX	KXXXXXX	KKKKKKK	KXXXXXX								: :	! !	
50 HOURS	43 MAKE MIN	0.0232			XXXXXXXXXXX		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	NATE NATIONAL NATIONA		IN KRIKKENIKENIKENIKENIKENIKENIKENIKENIKENIKE	n ny arakana na akaana na kanana aka aka ka ka ka ka ka ka ka ka ka ka	KKALKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	H M M M M M M M M M M M M M M M M M M M	HEREN HANDER HEREN HEREN HEREN HER HER HER HER HER HER HER HER HEREN HER HER HER HER HER HEREN H	XXXXXXXXXXXXXXXXXX	RXXXXXXXXXX				XXXXXXXXXXX			XXXXXXXX	
250	•	CTAURARE REVIATION	ZXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	-	XXXXXXXXXXXXXXXXXXXXXXXX		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	X I X X X X X X X X X X X X X X X X X X	THE STREET STREET	XXXXXXXXXXXXXXXXXXXXXXXX		MAXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	1 KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	NAME NAME AND SECOND SE	X X X X X X X X X X X X X X X X X X X	nan kankearakan anparak	KKLKKKKKKKKKK	XXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	X X X X X X X X X X X X X X X X X X X	٠		HAMBANE NAME OF STREET STREET STREET STREET	
05K	Alle Shi Let	CYAUDER	TXXXX		- XXXXXX		XXXXXX.	RXXXXX	XXXXXX.	医 	XXXXXX.	. XYXXXX	XXXXXX	. ZKKKK.	HHAHKKS	M K K K K K K K K K K K K K K K K K K K	XXXXXX.	. KKKKKK	KHKKKK.	SXXXXX	C X X X X X X X			*****	
GICI	e,	2	-	. e	~	Ø	Q#*,	€ I	-	=6	۶	4	•	₩.	8	•	~	ed :	_	~	۷.	0	0	2	
SCS-301C105K		0.430	0.5	0.935	N.940	0.945	0.35.0	0.935	0.000	0.985	0.473	6.616	3.080	はなん。ひ	0.530	2000	1.000	\$000	1.31.3	4.08.5	1.920	1.329	1,030	1.234	
4 ₹- 3 9 :	ELLE PATA PARTS	TO WELDE	0.93	6.530	4.4.4	0.960	3.945	0.960	0.055	. 0.045	3000	0.6%	\$40.	0.443	2000	3.093	\$000	E-00-	\$05.03	£ 603.3	1.015	1.020	いたからに	10000	

. Mande na mande de mande de mande de mande de mande de mande de mande de mande de mande de mande de mande de m -bandara kandandara kandandandanda kandanda kandanda k DELTA CAPACITIES TABLE XXXIV 0.0127 23 PAXINUM 250 HOURS *XXXXXXXXXXXXXXXXXXXXXX 0.000 STEWNACH BEUTAVIPM ******** ******** *XXXXXXXXX *XXXXXXX* THE REPORT SCS-301C105K 6.0072 7.007 0.017 A 20.9 5.002 g 6 C. C. 7.0.0 10.

XXXXXXXXXX

0.013

3.012

21000

INITIAL CAPACITIES

		٠	r
		Ė	ż
	ċ		ě
	4	Ĭ	ġ
	ı	•	٠
	•	•	•
-	1	÷	
٠	4	ď	•
٠		1	ı
	8	ď	•
	7	7	š
	ì	3	Š
7	ú	/	,

2000 HOURS

		0-1084 \$ 19 PEDIAN 0.1020		XXXXX		The second secon			The second secon	The second secon						The second secon	n n n n n n n n n n n n n n n n n n n	THE THE PROPERTY OF THE PROPERTY AND THE PROPERTY OF THE PROPE		HERMAN MARKET AND THE PROPERTY OF THE PROPERTY			, a x x x x				The second secon	-	
STOC SOLUTION	WINIMIN D. DORS & 24 MANCHINE	SYANDARD DEUTATION OF COSTS					*************			* XXXXXXXXXXXX	HHYKHKHKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	PHENERICAL MENERICAL PROPERTY AND A SERVICE OF THE	RAKAKKAKAKKEKAKKAKKKKKKKKKKKKKKKKKKKKKK	THE STREET PROPERTY OF STREET	**************************************		**************************************	· NAKARKEKEKEKE	TOTOLOGIST COSCUSION OF ANNAMED HAND MANAMED MANAMED AND MANAMED HAND	HEREKKEKKEKKEKKEKKEKEKEKEKEKEKEKEKEKEKEK	AXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	- XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	HAMMAN MAN MAN MAN MAN MAN MAN MAN MAN MA		-	entre en en en en en en en en en en en en en	HARRANAN MARKANAN MAR	
	94. STRING PUTATE AN	VILUE D. 101	2		101174 0.095		6	250.7	1.036 0.097				11.100 0.100		2	0.101 0.102 D	1	~	-		101 - 101 -	, L	35	3-13' 7-106	0.10, 0.107	0 101.0 101.0	1.0 %	0.178 O.108 2	-

FINAL CAPACITIES

	9.1004		The second secon		HANNANANAN HANNANAN HAN							The second secon				n n n n n n n n n n n n n n n n n n n			I W W W W W W W W W W W W W W W W W W W			n na na na na na na na na na na na na na				IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX					
	0-1060 # 14 MEDIAN				n kanakanakanakanakanakanakanakanakanaka			•								KANANANANANANANANANANAN	XXXXXXXXXXXXXXXXXX	•	HANNANGARANNYKKANNANKANANANANANKANKANKANKANKANKANKA		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	an an an an an an an an an an an an an a	•			n here experted and experted an		•			
	34 MAXIMUM		**************************************		KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK				KKKKKKKKKKKKKKKKKK	H H H H H H H H H H H H H H H H H H H						H X X X X X X X X X X X X X X X X X X X	Y X X X X X X X X X X X X X X X X X X X		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	H H H H H H H H H H H H H H H H H H H	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX					
04K 2000	MINIMUM 0.0929 4	STANDAPD DEVIATION	* X W X X X X X X X X X X X X X X X X X	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	- XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************			XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	*****************	*YXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	*******************	******************	**************************************	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	******************	**************************************	**************************************	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			*****************	***************************************	
SCS-301B104K	NTS 49	0.0996 CAMP4	0.093 2	1 +60.0	3.006	3.09%	0.434	0, 095	5.096 2	6.096	0.097 0	C 160.0	J. 594	0.048	1 060° (0.009	001.0	1 6, 0	3.1 6	3.101 2	0.137 3	9.17% \$	1 601.0	0,103 2	3.104	4 7010	11.105 A	1.105 0	1.106 1	3.136	
_£∵≡; (P SATA PPINTS	40 Valley	3.043	5.033	1,194	7.034	350.0	0.095	A.695	0.00%	80°C	2.097	5.397	160.0	200.	0.000	っしゅし	0.133	n. 165	3.191	101.6	3.132	2.102	0.103	5.1.53	20100	0.104	2010	3.105	51.5	

DELTA CAPACITIES

4		ĺ	

•			֡
•	•		

2000 HOURS

# 17 maximum	**************************************	2 . ***********************************
autorite i i belordere e bek. Norbil (bl. 1861)	STARIAND OF VIATION OF	2000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

- branch dreiche bereiche bereiche bereiche bereiche bereiche bereich bereiche bereich bere INITIAL CAPACITIES 1.0830 TABLE XXXIV 11 44X14UM 2000 HOURS NAKAMAKAMAKAMAKAMAKAMAKA · Karrana karana · Karana kara 0.9104 SYABBARD DEVINE . NEXXERERACENT SCS-301B105K PO 1475

-price preservate de la compante de

. MARIAN . Nemanana manana manana kanana are.

000

* KKKKKKKKKKKK

	Aug.			XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************
	0.9990			K K K K K K K K K K K K K K K K K K K	
TABLE XXXIV FINAL CAPACITIES 300 HOURS	6 11 MAXINGH 1.00/35 2 64 HPDIAN				
95.X	STAROLAS REVIETION	**************************************	CHANNAMANANANA LANKANANANANANA LANKANANANANANANA LANKANANANANANANANANANANANANANANANANANAN	PROPERTY OF THE PROPERTY OF TH	**************************************
SCS-301B105K	0.4954 COUNT 0.410	0.930 0 0.930 1	0.940 %	0000 0000 0000 0000 0000 0000	1 0000
	04TA PMYTS WALUF 79' TO CO	0.970 0.970 0.970	0.950 0.950 0.976	1.010	25.0

DELTA CAPACITIES

	3	3CR-301B1058	103K	79	SAUCH OOOS	2							
0.0059 COMPANDER 1 SERVERNER NEW TO 0.001 1 SERVERNER NEW TO 0.005 1 SERVERNER NEW TO 0.005 2 SERVERNER NEW TO 0.005 4 SERVERNER NEW TO 0.005 4 SERVERNER NEW TO 0.005 4 SERVERNER NEW TO 0.005 4 SERVERNER NEW TO 0.005 4 SERVERNER NEW TO 0.005 5 SERVERNER NEW TO 0.005 5 SERVERNER NEW TO 0.005 5 SERVERNER NEW TO 0.005 5 SERVER NEW TO NEW TO 0.005 5 SERVER NEW TO NEW TO 0.005 5 SERVER NEW TO NEW		\$	HE STATE	6.0305	\$ 42	MAXIMUS	9.0169	•	!-	MED LAN	0.0053		
0.002 1 - MMMMANHHANKKANK 0.002 2 - NAKKHANKKANKANK 0.003 3 - NAKKHANKHANKKAN 0.004 3 - NAKKHANKHANKAN 0.005 2 - NAKKHANKHANKAN 0.005 2 - NAKKHANKHANKAN 0.005 2 - NAKKHANKAN 0.005 3 - NAKKHANKAN 0.006 3 - NAKKHANKAN 0.006 3 - NAKKHANKAN 0.006 3 - NAKKHANKAN 0.006 3 - NAKKHANKAN 0.006 3 - NAKKHANKAN 0.006 3 - NAKKHANKAN 0.006 3 - NAKKHANKAN 0.006 3 - NAKKHANKAN 0.006 3 - NAKKHANKAN 0.010 3 - NAKKHANKAN 0.010 2 - NAKKHANKAN 0.011 2 - NAKKHANKAN 0.012 0 - NAKKHANKAN 0.013 0 - NAKKHANKAN 0.013 0 - NAKKHANKAN 0.014 0 - NAKKHANKAN 0.015 0 - NAKKHANKAN 0.016 0 - NAKKHANKAN 0.016 0 - NAKKHANKAN 0.017 0 - NAKKHANKAN 0.018 0 - NAKKHAN	1	9599	SYAMSAKIS	REVENIATION	0° 00	36		<u> </u>	: ` 	•			
		ļ	1	-	1	1	•			,		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	;
	9.30	-	· MAKKKKK	CHANKK									
	100.0	*	.XXXXXXX.	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXX	XXXXXXXXXX	KXXX				•		
	0.00	-	- KKKKKKK	IXXXXX	:	•							
- X	200°C	^	- KAKKKKK	THEFT		×		:				1	•
	500.0	þ		.,					!				
**************************************	COG. C		SXXXXXX.	XXXXX						•			
3 . XHTXYAKKHYHKKX 4 . XHTXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	+00°C		. NYKKKKK	INN KKKKKKKK	XXXXXXXX	XXXXXXXXXXX	KXXXXXXXXX	XXXXX	KXXXX	XXXXXXXXX	L XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KXXXXXXXXXXXXX	XXX
2 . XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	ስ.33ሳ	•	XXXXXXX.	THE NEW KENTER	XXXXXXXX.	XXXXXXXXXXXX	KKKK				•		
2 .XKENEYKKKRRKKER 3 .XEKKYKKRKKKRRKKER 6 .XEKKKANKKKKKKKKKK 1 .XEKKKANKKKKK 2 .XEKKKANKKKKK 2 .XEKKKANKKKKK 2 .XEKKKANKKKKK 2 .XEKKKANKKKKKK 2 .XEKKKKKKKKKK 1 .XEKKKKKKKKKK 2 .XEKKKKKKKKKK 2 .XEKKKKKKKKKK 1 .XEKKKKKKKKKKK 2 .XEKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	0.00	*	XXXXXXXX	(X KXXXXXXXXXX	XXXXXXXX	TAKKXYXXXXX	CXXXXXXXXXX	KXXXX	XXXX	•			
3 . WAKANYARARANANA 5 . WAKANAYAKANANA 6 . WAKANAKANANA 9 . WAKANAKANANA 2 . WAKANAKANANA 2 . WAKANAKANANA 1 . WAKANAKANANA 0 . WAKANAKANANA 1 . WAKANAKANANA 0 . WAKANAKANANA 1 . WAKANAKANANA 2 . WAKANAKANANA	300°C	~	XXXXXXXXX,	IXXXXXXXXXXI	THXXXXXX							•	
3 . WERKNYKORREKKEN 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00%	-	XXXXXXXX	HXXXXXXXXXX	XXXXXXXX	XXXXXXXXXXXX	LXXX		1				
1	0.034	~	- KYXXXXX	TH KXXXXXXXX	KXXXXXXX	XXXXXXXXXXX	KXXX			-			
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	746.0	~	K KY X X X X X	I X X X X X X X X X X X X	YXXXXXY,	XXXXXXXXXXX	KKKKKKKKK	XXXXX	XXXX	XXXXXXXX	HKKKKKKKKKKKK	××	
1	D. 307	C											
0 0 0 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	13.CRA	-	*XXXXXXX	KKKKKK						-			
1	0.00	C	·•			,		!				,	ł
	1.15 A	þ			! !			! !	•				
	0000		*XXXXXX*	CAMMEN	,		:	,		•			
2 . XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	010.0	ęs.	WKKANAN.	:	XXXXXXXX	XXXXXXXXXXX	TXXX					-	
2 . XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	010.0	~	. XXXXXXX	KKKKKKKKKK		×	!			;		•	
1 . ***********************************	110.0	2	YAKKANA.	I X X X X X X X X X X X X		*	· !	!	u.	•			
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	110.0		. XXXXXXX	KXXXXX				;	•				
O . THE THE THE THE THE TENT OF THE TENT O	10.0	0							!				
THE THE THE TANK THE TERM THE	0.012	0			1				:				
O O O O O O O O O O O O O O O O O O O	F10.0	-	. THEXXAGE	,		! ; }			:		•	•	
O PERKERHERRES 1	0.113	C		1		1							
2 -XXECEDACKEREER	716.6	0										•	•
0-0-16 2 SKRRYKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	1.014		* XXXXXXX	CXXXXXX				,	•			•	
	1.014	~	XXXXXXX.	CXXXXXXXXXX	XXXXXXX	*	:	ı . I				•	

300

TABLE XXXIV

INITIAL CAPACITIES

الجوا الإجراء	SCS-301B405K	0184	105K	2000	2000 HOURS						in the second
DE SATA PRIVIS		30	MINIMEN	3. 7320 .	16 MAXILUM	4-1853 # 45	MEDIAN	3.9860		.*.	
FAU VALUE	200	370K	STANDARD OFVIAT	EV TAT ION	0.1077	:	1		•	• •	
127.	3.743	-	XXXXXXXXXXX	*X X X X X X X X X X X X X X X X X X X	XXXX				:	: .	į
740	3.760	c ;			;				1		:
, , 79.)	1.780	~	. #####################################	X	*****						
O(-1-5	1.325.	þ							-		
4.420	040.5	4	. XXXXXXXXXXXXX	XXXXXXXXXXXX	H H H H H H H H H H H H H H H H H H H	KXXXXXXXXXXXXX		-			
1,341)	3.360	0				-	•			1	
3.850	7. WED	6									
C#	3.970	-	**********	XXX						•	
1.000	3.420	c							-		•
i 650.	3.940	3	. KKKKKKK	XXXXXXXXXXXX	***********	MAKAKAKAKAKAKAKAKAKAKAKAKAKAKAKAKAKAKAK	KXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX	XXXXXXXX	CKXXXXX	XXXX
1.940	3.950	0									
3, 14.)	3.9.0		********************************		KKK KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	LKKKKKKKKKK			t .		
, 1, 931	(10.00	•	. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	************	XXXXXXXXXXXXXXXX	nakkakakakakakakakakakakakakaka arakakakak	XXXXXXXXXXXX	LAKKKKK		2-1	137
	6.320	2	- AXXXXXXXXXXXXX	******	XXXX		:			•	
7.0.7 F	4. 240	~	* XXXXX¥XXXXXXX	XXXXXXXXXXX	XXX.4XXXXXXXXXXXXX	KHTHHHINKKYYHYKYKYKHYHHHINKKXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KXXXXXXXXXXXX	(XXXXXXXXXXXXX)	FXXXXX	-	
4.350	6.043	c	· ·				•		•	,	•
4.040	4.040	m	. XXXXXXX.	XXXXXXXXXXXXX	. KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK					-	
C. C. 5	4.19%	_	. XXXXXXXX	************	**********	MHARHER HARRER HARRER HARRER HARRER HARRER HARRER HARRER HARRER HARRER HARRER HARRER HARRER HARRER HARRER HARRE	CKXXXXXXXXX	XXXXXXXXXXXXXXXX	XXXXXX		
, . 1 30	4.123	C				•		•			
061.4	6.149	, 	* FAXXXXXXXXX	XXX				,			
4.14.)	4.14.	۵.					-	•			
4.16.)	4.140	0					!	:	· •	!	
081.	6.200	-	****	XXX						:	•
3	•							•			
÷	:	1				:		•			

Hard that the state of the stat

FINAL CAPACITIES

1475 50	1475 50	; ; ;	SCS_301B405K	9405K	K 2000 HOURS	
3.740 3	3.040 5	MEAN VALTE TO FROM TO	37 94 4	c	3.7240 # 16 "AXI"US 4.1340 # 48 "EDIAN	
3-670 3 - CARAMANANANANANANANANANANANANANANANANANAN	3-900 3 . *********************************	1.720	3,740	c	. KAHAMAMAMAMAH	Programme and Pr
3.920 0 1.830 0 2.640 1 3.640 4 3.640 4 3.640 1 3.640 1 3.640 1 3.640 1 3.640 3 3.640 3 3.640 3 3.640 3 3.640 3 3.640 3 3.640 3 3.640 4 4.050 1 3.640 3 3.640 3 3.640 3 3.640 3 3.640 3 3.640 3 3.640 3 3.640 4 4.050 1 3.640 4 4.050 1 3.640 4 4.050 1 3.640 3 3.640 3 3.640 3 3.640 4 4.050 1 3.640 4 4.050 1 3.640 4 4.050 1 3.640 4 4.050 1 3.640 4 4.050 1 3.640 3 3.640 3 3.640 4 4.050 1 3.640 1 3.640	3-6-0 3-6-0	3.753	3.400	1 . xx	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	
3-650 0 3-690 0 3-690 0 3-690 0 3-690 0 3-690 0 3-690 0 3-690 0 3-690 0 3-690 0 3-690 1 3-70 10 3-70 1 3-70	3-640 0 3-640 0 3-640 0 3-640 0 3-640 1 3-70 10 - KHEKKKAKHHHERHENENENENENENENENENENENENENENENENEN	3.90	3.920	×.	IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	
3.970	3-970	9.940 7.885	3.450	66		1
3-950 I . HRTH MANNERSHEN MANNERS	3-9-5 1 - жити жити жити жити жити жити жити жи	3,980	3.430	XX		
3.942 \$. **********************************	3-940 \$.NHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH	5.040	3.950	XX		KXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
4-070 I - жинирики 4-040 7 - жинирикикикикикикикикикикикикикикикикикик	4-070 I - жинирики 4-040 7 - жинирикикикикикикикикикикикикикикикикики 4-040 7 - жинирикикики 4-060 4 - жинирикикики 4-120 0 - жинирики 4-120 0 - жинирики	3.940	3.080	KX.	× ×	
4.049 0 4. KUNHRANKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	4.049 0 4. KUNHRANKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	4.77	4.040	KX.	RENEWENERSKE STATEMENT STA	
4-13) 1 - XXXXXXXXXXX 4-140 0 +150 1 - XXXXXXXXXX	4-13) 1 - XXXXXXXXXXX 4-120 0 4-150 1 - XXXXXXXXX	1.40.4 1.06.4	4.040		できることをおりますが、 1997年では、 1997年には	
4.150 1 AKKWAMMAK	4.150 1 жикухики	6.043 6.203	4.120	××	THE THE TAX A TOTAL PARTY OF THE TAX A TOTAL P	
		••150	411.4	***	HHHHHHH	

DELTA CAPACITIES

2000 HOURS

SCS-301B405K

- vi						(KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	•						•			<u> </u>						,	•		
0.0295				!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!	3	TAXXXXXXXX		3	****	•		:		•		:			XXXXXXXXXXXXXX	X X X X X X X X X X X X X X X X X X X	X X X X X X X X X X X X X			:				
MEDIAN		:				XXXXXXXXXXX		XXX	XXXXXXXXXXX			1						XXXX	XXXXXXXXXX	**********	XXXXXXXXXX		•	:				
99		-				XXXXXX		X X X X X X	= XXXXX							•		XXXXXX	XXXXX	XXXXX	XXXXX							
0.3520					×	XXXXXXXXX	: :	XXXXXXXXXX	XXXXXXXXXX			•		×		×	-	XXXXXXXXX	XXXXXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX			: : :				×
2 MAXIMIM	0.0144			•	THE SHARK SHIP SHEET SHE	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KANNANKKKKKKKKKKKKKKK	X A L X X X X X X X X X X X X X X X X X	XXXXXXXXXXXXXXXXXX					XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		HXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KKKINXKULNALALKKKKKKKKKKKNNKKKXXXXXXXXXXXXXXXXXX	KKKKKEUKXXKKKKKKKKKYYXXKKKXXXXKKKKKKKKXXXXXXXX	nnany namakananananananananananananananananana			XXXXXXXXXXXXXXXXXXXXXXXXX				KYXKXXX KXKXXXXXXXXXXXXXXXXXXXXXXXXXXXX
9.0020	SYTATION		**************************************		XXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX	Kankanfankankanka	XXXXXXXXXXXXXXXXXXXXXXX	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	-	***********************			******************	**************	KXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX	***********************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXX	******************		nkeakkkeakerekekke
MINIMINIM	STANDAGE DEVIATION		******	-	*XXXXXXX	XXXXXXX	KAXXXXX	* XXXXXXXX	*XXXXXXXX		YXXXXXX.			*XXXXXXXX	YXXXXXX*	XXXXXXX.	XXXXXXXX.	XXXXXXXX	*******	XXXXXXX.	*XXXXXXX	*XXXXXXX	XXXXXXX.	YXXXXXX.	*XXXXXX	XXXXXXXX	XXXXXXX.	***************************************
S.C.	292		 -	c	. ~	Ŀ.	2	~		د	-	0	5	r,	-	۲,	.~	-	7	4		-	_	^	_ -		 	ر: ان
5171	2920.0	C . UNT	5.662	1.304	3000	1,308	010.0	7.017	916-0	0.016	3.038	0.020	570.0	3.324	420.0	7.130	(11,11)	9.032	4.034	0.036	360.0	7,040	5,742	7.054	0.046	0.748	0.050	0.042
THE DATA PRINCE	JAY VALITY	15 P.O. 17	0.000	, 000°C	36036	303	0.00	0.010	2.0.0	0,M4	1,915	J.016	0.0.0	1,023	0.024	44.0.	261	0.030	-) ett 31 -	410.0	3, 336	0.032	0,000	2.00	3.01.5	040	3,0,0	050 %

INITIAL CAPACITIES

2000 HOURS
SCS-301C473K

-	0.0453	:					NAKKKKKKK WAKKKKKKKKKKKKKKKKKKKKKKKKKKKK			•		nkeen en en kanken keen en kanken kanken kankan kan kan kan kan kankan kanka kanka kankan kanka kanka kanka ka		XXXXXXXX											
	MEDIAN			:			XXXXXXXX		•	•		XXXXXXX		XXXXXXXX	XXXXXX									•	;
	37	1		:			XXXXX					XXXX		XXXXX	XXXXX										:
	•	1		:			XXXXX	•		t		XXXXX		XXXXX	XXXXX					:					;
	0.0474					:	XXXXXXX	}		:		XXXXXXXX		XXXXXXX	XXXXXXXX										1
	29 MAXI4174	0190.0		- XXXXXXXXXXX		:	Y K K H X X X X X X X X X X X X X X X X X	:	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			XXXXXXXXXXXXX		TAAXXYXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************			:		XXXXXXXXXXXXXXXXXX					
)) !	5	00.0		KXXXXX	KXXX	XXXX	KXXXX	XXXX	(XXXX)	XXX		KKKK)	×××	XXXXXX	(XXXX)				XXXX	KXXXXX		•		•	
	C.0437 #	CATION		*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXX	×		~	XXXXXXXXXXXXXXXXX		XXXXXXXXXXXX	XXXXXXXXXXXXXXX		×		×.×		XXXXXXXXXXXXXXX	~		İ	עא	. .	
	MINIKUM	CYA GOAFA HE CTATITY		XXXXXXXXXX	. XXXXXXXXXX	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	******************	. TXXXXXXXXXXXXXXXX	************	<u> </u>		*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	*************	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	YYXYXXXXXXX.	**************************************	-	CXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			*****	*********	
	0	53		3	~	~ 	4	~	~	\ -,	0	•	~	÷	ي	-	~	[^	 -	0	c		_	
		0.0453	CUCHT	0.044	0.064	0.046	0.044	0.065	0.045	0.045	0.045	0.045	9.046	1000	0,045	0.0%5	7.044	0.047	7+0,0	7.00	C.047	7.057	0,148	0.040	
ن نوم:	OF DATA PRINTS	74	1 N. 10	0.044	7,066	3,246	0.0%	2000	7.045	280.0	7.045	530.0	1,045	1.065	.)•0.64	3,466	ט"ט אַנ	1.0.5	2.5.7	2.0.0	3 3 3 4 7	トラウ・・	0.047	3.34	

FINAL CAPACITIES

	0.3469 # 48 MENIAN 0.0449					IXXXXXXXXXX			The second secon		TARKAAFKKKKKKKKKKATORITIET TOTORITIET	•	K K K K K K K K K K K K K K K K K K K					Y THE THE TERMETERS OF				HAKHAKKKKK				A CONTRACTOR OF THE PROPERTY O											
2000 HOURS	# 11 PAXIMUM	4.3010	KKKKKKKKKKKK			XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX				**************************************	**************************************			<u> </u>				1	*************	***********			. N X X X X X X X X X X X X X X X X X X			***********		KKKKKKKKKKKK									NAMES AND ASSESSMENT OF THE PARTY OF THE PAR
	OLYUPO WENING		***************************************			*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			**************************************				*XXXXXXXXXXXXXXXXX			***********	****					**********						XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		-	******************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	•
SCS-301C473K	413 50	2	0.043 2	0.043		1.743 3	9.764	3.056	10.166	0.044 2	7,044		7.0		7:0:4		3.045 0	1	0.045	2,065	3.145	7.0.745	3,745	0.045	0 000	450.0	1 3.0.0	3.335 2	7.0.6		9.04A 0	- P	C 646 C		7 240	3.047	1 111
ا مرم لو	F OF TATA POINT	\neg	1.00.0	1,0,0	1,00°C	2,2,2		2000		7. O. C.	3.00	750-0	7.044			34.	6.044		() () () () () () () () () ()		1,056	5 70 1	1.755	0,046		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	12.	1.345	1.00.	1.745	13. Jak	300	, ,			7.90	740.1

ABO. COLOMBE C

中華人民 人名英格兰人姓氏克里特的变体 人名英格兰人姓氏克里特的变体

DELTA CAPACITIES

2
He
-
2000 HOUR
×
L)
_
7
-
0
=
0
Ā
$\mathbf{-}$
\sim
• •
د،
×
X
3X
73K
73K
473K
473K
C473K
C473K
1C473K
1C473K
01C473K
301C473K
301C473K
.301C473K
3.301C473K
S. 301C473K
.S. 301C473K
CS-301C473K
3CS-301C473K
SCS-301C473K

50 PINI WOM 0.0000 5 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	# 15 4aximum
C	######################################
FC COUNT C. 200	
0.000 2 . XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	
0.000 5.000 5.0000000000000000000000000	<pre></pre>
0.000 6. *******************************	
0.001 8 . WXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	IPTHERRY FREEKREEREEREEREEREEREEREEREEREEREEREEREE
0.001 8 . XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************
0.001 2 . NYKKKKKKKKKKKKKKKK 0.001 2 . NYKKKKKKKKKKKKK 0.001 3 . NYKKKKKKKKKKKK 0.001 7 . NYKKKKKKKKKKK 0.001 1 . XYKKKKKKKKKK 0.001 1 . XYKKKKKKKK 0.001 1 . XYKKKKKKK 0.001 0 . NYKKKKKKKK	KKKK KARAKKEKKKK KARAKKEKKKK KARAKKEKKKK KARAKKEKKKK KARAKKEKKKKKKKKKEKKEKKKKKKKKKK
0.001 2 .Nexxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	KRYKKKKKKKK KRYKKKKKKKKKKKKKKKKKKKKKKK
0.001 3 .NYXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	X K K K K K K K K K K K K K K K K K K K
0.001 7 XAXXXXXXXXXXXXXXXXXXXXX 0.001 1 XYXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	IN A A KARINKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK
0.001 1 XYKKXYKKKKK 0.001 1 XYKKXXXKKKK 0.001 1 XKKKXXXKKKK 0.001 0 1	***************************************
0.001 1 XVXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	
0 1001 0 100 0	
7, 301 0	
1	
0 266.6 166.6	
0 200.00 500.00	
0,000	
0.112 0	
1.007 0.007 0	
0.00 666	
HANNERSKE 1 SCC. C 500.0	

INITIAL CAPACITIES

1C334K	
33	
Q	
301	
SCS-	
ŭ	

2000 HOURS

2 MEDIA4 0.3239	! !		i . 1									KKKXXXXXXXXXXX	n n n n n n n n n n n n n n n n n n n	•	: XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			******								
0.3434 #													XXXXXXXXXXX	•	XXXXXXXXXXX		: :	XXXXXXXXXX		XXXXXXXX				1	XXXXXXX	:
PR MAXIMUM	0.0105		CXXXXXX			;		CYKXXXXXXXXXXXXX				XXXXXXXXXXX	XXXX <i>X</i> XXXXXXXXXXXX		XXXXXXXXXXXXXXXXX		HAKKKKKKKKKKKKKK	I WANNE NA NA NA NA NA NA NA NA NA NA NA NA NA		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		X			**************************************	
•			************************					************************		APRAKTERENTATE AKKEAKEREKAKKKKKKKKKKKKKKKKKKKKKKKKKKK			IN CHANKAKKAKK		XYXXXXXXXXXXXXXXXXXXXXX		ж	. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	!	XXXXXXXXXXXXXXX	XXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX		*	:
HENT RIFT	STANDER REVIEW THE		CXXXXXXXX.					CXXXXXXX		S A P X X X X X X X X X X X X X X X X X X		*************	* XKXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		. XYXXXXX.	. XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	. XXXXXXXX	XXXXXXXXXXX	**************	XXXXXXXXXXX	*XXXXXX	XXXXXXXX		**************************************	
50	44		~	0	0	0	c	~	c	m	c	•	=	0	•	~	_	ď		*	-	7	2	c	ď	Ì
INTS	F. 6	CUCINT	3.300	3.392	0.304	905.0	5.304	9.110	0.312	0.314	9116	9.31A	A	0.322	42:1	D. 126	0.3.20	J. 330	0.332	3.334	3.16	7,71	0.340	3.342	0.344	
GOF DATA POINTS	JU IFA AVIOL	إلاده المال المال	5.233	0.05.0	6.302	40r.r .	10.30	5.303	1.31.9	0.312	7,314	3.114	15.1	3.320	0.335	9,6,0	7.3.5	1 4 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1.313	211°0 ·	7.5	1.334	5 3.338	7.24.1	7.342	

FINAL CAPACITIES

	1															XXXX		:		1	XXXX
								:			-	1			- 1	(XXXX)		:		4	CXXXX
			·			;						i i			:	XXXXX			××	1	XXXXX
												1				XXXXX			XXXXX		XXXXX
	0.3223		:	:				;								XXXXXXXXX			XXXXXXXXXX		XXXXXXXXX
	MEDIAN		•					, ·						:		neee en en en en en en en en en en en en			<u>Kananananananananananananananananananan</u>		Kanatanakananakanakanakanakanakanakanakan
								; ;		1						(XXXXX)			(XXXXX)		CXXXXX
	•	1		1												XXXXXX			XXXXX		XXXXX
	0.3399 4 2		· !													XXXXXXXXX			KXXXXXXXX		********
S)	29 MAXIBIP	 -	1											*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		CXXXXXXXX			CXXXXXXXX		(KXXXXXXX)
2000 HOURS	28	0.011		1							XXX			XXXXXX		XXXXX			XXXXXX		XXXXXX
2006	=										CXXXX			CXXXXX		XXXXX			XXXXXX		KKKKK
	0. 2862	DEVIAT IN	XXXX						XXXX	i	. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			XXXXXXXX		XXXXXXXXXXXXXXXX		XXXX	XXXXXXXXXXXXXXXXXX	***	X XXX X X X X X X X X X X X X X X X X
34K	MINI MIR	STANDARD DEVIATION	XXXXXXXXXXXXX						. XXXXXXXXXXXXX		XXXXXXXX.			*XXXXXXX		*XXXXXXX		· XXXXXXXXXXX	*XXXXXXX	**********	******
0103	•	l el	-	6	c	¢	0	0	-	0	~	0	0	~	0	Œ	c	,	1	-	•
SCS-301C334K		0.3718	0.783	C. 790	0.292	0.144	0.794	A C.	3, 105	13, 3412	3, 104	10.30F	0.138	0.310	2.312	3.314	312.6	n. 31A	5.320	0.322	3.334
	MATA POTUTS	S VALUE	3.3.46	0.248	3.700	3.202	366	9070	3, 20× T	. 300°.	7.5.5	0.304	1, 100	46.F.	0.310	1.312	3.313	0.314	3.31	0.220	1.327

. HHANNAN HANNAN
XXXXXXXXXXXX XXXXXXXXXXXXXXX

0.324

3. 434 3.398 0.138

A THE KANTERNAME HANDERNAME HER SERVING SERVIN . A KAN'N'SKRIN KAN'N KAN'N KAN'N KAN'N KAN'N KAN'N KAN'N KAN'N KAN'N KAN'N KAN'N KAN'N KAN'N KAN'N KAN'N KAN' FOIAN * PANTER DELTA CAPACITIES 0.0131 TABLE XXXIV KAXS ME 2000 HOURS 0.0000 CTEMBALO MEUTAYAN XXXXXXXXXXXXXXX XXXXXXXXXXXXXXX ***** . XXXXXXXXXXXXX とうしょしょ SCS-301C334K Ş 0.6032 0.035 0.010.0 500 .00 0.013 40° . 00 · 7.007 1000 .003 .006 110.0 0.012 3.004 STATE . 333 <u>`</u>00• 200.0 0.000 0.013 0.010 ... 216 ?

INITIAL CAPACITIES

		-
1	ζ	
1		
1	ί	į
1	Ų	1

2000 HOURS

	})				}						Ŧ	•	 !
F DATA POINTS	INTS	20	MINI MUH	0.9203	4 3	43 MAXIMUR	1.0965	•	9.6	1.0965 # 28 MEDIAN	0.9518	, ,		- 1
AV WALLER	1696°D		SYANDADI DEVLAT	FUTATION	0.0434	21	! ! !		! :					
0.6.0	0.010	*	XXXXXXXXX	. KXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXX	CXXXXXXXXXXX		-		1	1	:		
0.939	0.940	ç.	*XXXXXXX	HANAN KERKEKEKEKEKEKEKEKEKEKEKEKEKEKEKEKEKEKE	XXXXX	KXXXXXXXXXXX	XXXXXXXXX	XXXX	XXXX	XXXXXXXXXXX	CKKKKKKK	XXXXXX	CKKKKKK	KXXXX
3.940	0.950	10	*********	<u>YETETYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYYY</u>	XXXXX	TXXXXXXXXXXX	XXXXXXXXX	XXXX	XXXX	KKKKKKKKK	KKKKKKKK	(XXXXXXI)	KXXXXXX	XXXXX
0.950	0.950	ø	***********	XXXXXXXXXXX	XXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXX	XXXX	XXXX	XXX	1	1		
1.941	3.970	•	**************************************	KKKKKKKKKKK	XXXXX	XXXXXXXXXXXXXXXXXXXXXXXX	; ; ;	; ; ;	;					
0.010	0.980	~	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXX XXXXX									;	
7.940	066.0	2	* XXXXXXXXXXXXXXX	XXXXXXXXXX					:	:	: !		•	:
0.000	1.000	ဂ								,		•	•	
1-100	1.010	-	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXX	(XX	· ·	!	:	: : : !				
1.313	1.920		*XXXXXXXXX	×								•	i	•
1:0:1	1.930	-	XXXXXXXXXX.					! !				•		
1.030	1.040	~	****	XXXXXXXXXXXX								,		-
1	1.580	-	XXXXXXXXXXX.						i i					
1.050	3.080	0	į									:		i
1.050	1.370	+	XXXXXXXXX.	. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXX	CXX	i			•		:		-
1.070	1.093	0		:								1	i !	
1.04)	060.1	þ												
1.030	1.100	-	****	×			1	!		1	i		;	į
								! 						
•														

TABLE XXXIV

FINAL CAPACITIES

2000 HOURS	50 MINIMEN D.9139 4 30 MAXINUM 1.0621 B 28 ACCIAN 0.9437	DATA DENTANT		MENNAMENT STATES	・ ススメングドススメングに対象を対象を対象を対象となるというできない。	•XXHXXHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH	• Heneral frethererenerererenerererenerere	* NANKENENNAN HANDENNAN HERRENNAN HANDENNAN HANDENNAN HANDENNAN HANDENNAN HANDENNAN HER	XXXXXX	* NATARINAL NATARIAN'		**************************************	- XPXHYNXHXXXXXXXX		XXXXXX	* WHENENENENENENENENENENENENENENENENENENEN	A CONTRACTOR OF THE PROPERTY O	* NATHER NATIONAL NAT	
SCS-301C105K		0.451	COMI	6.920 2	0.930	0.940	n.950 &	6 026.4	3.970	0.940	Q 066.0	1.900 3	1.010	1.320 0	1.030	1.040 2	3.050	1.050 3	1
	of nara polyts	FEB VALUE	SPIDE TO	0.913	0.42.1	3.930	0.0	0.35	3,040	3.473	3.940	J.Bang	1.000	1.013	1.020	1.0.1	1.0.1	1.350	

*XXXXXXXX

TABLE XXXIV

DELTA CAPACITIES

w N									•			•	-	
	SCS-301C105K	S	MSO!	2000 HOURS	HOOF	99 :					1 13 17	€,	:	
OF NATA FOLKTS		8	BIRTHUM	_ 	7	41 MAXIMUM	0.0147	0+	MEDIAM	0.0008	: :	ı •	∉ . 1	
אננ	0.058	_	STANDARD DRUTATE	DATE FAM	5.00.0									1
Ford TO	CAUNT					,								
200°C	0.001	_	*XXXXXXXXXXX	XXX			!						}	; ;
, 0.001	0.002	~	. NYKKKKK.											
4.032	3.002	~	CXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX								į		:
5,062	0.003	Q												
600°0	0.003	þ	-										1	•
7.007	100.0	-	XXXXXXXXXX.	XXX					,					
0.036	0.00	0									-			4
. 0.00¢	0.00g	0	-	•		-								
540°C	9.009	-	XXXXXXXXXX.	XXX			***************************************							:
.00°0	J.006	~	KKKKKKKKKKK	ZAXXXXXXXXXXXX		,				•		*		
7.00¢	950.0	4	CHANNANANANA .		XXXXX	************************	AMAMAMAMA	XXXXXX					-	;
3 0.035	3.007	_	XXXXXXX	XXX										
3 0.00°	0.007	~	. XXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXX						· · · · · · · · · · · · · · · · · · ·	:	i		
7.037	3.008	~	***********	XXXXXXXXXXXXX		•								
300.0	0,308	-	XXXXXXXXXX	İ				:		,		1		
1.033	500.0	_	C XXXXXXXXXX	XXX				_						
646°C	600.0	-	. XXXXXXXXXXXX	XXX									•	:
£ 0.00	0.000	•	XXXXXXXXXXXXXXXX		XXXXX	MAKKER KERKEKEKEKEKEKEKEKEKEKEKEKEKEKEKEKE	XXXXXXXXXX	XXXXX						
016.0	010.0	0	XXXXXXXXXXXXX		XXXXX	KXXXXXXXXX	(REXXXXXXX)	XXXXX	XXXXXXXXXX	na na mana na mana na mana na mana na mana na mana na mana na mana na mana na mana na mana na mana na mana na m	IXXXXXX.	XXXXX	N X X X X X	*
010.0	1.0.0	~	*XXXXXXXXXXXXX		XXXXX		PXXXXXXX	KKKKKK	KXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		\ \ \ \		C C C C C C C C C C
110%	0.01	-	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXX	CKKKK	1					•	:	
110.0	0.912	e	•						•				·	
£ 6.012	0.612	0		**************************************		***************************************		!			!			:
3.012	0.413	~*	* XXXXXXXXXX	XYX										
2.413	3.013		SXXXXXXXXX	XXX			* * * * * * * * * * * * * * * * * * * *		:	:	!			
0.013	\$ 10°0	0											,	

. Kananakana .

THE RELEASE OF THE PARTY OF THE

INITIAL CAPACITIES

4600 HOURS

0.1070 a 19 19 19 19 19 19 19 19 19 19 19 19 19					N N N N N N N N N N N N N N N N N N N		M M	34. S. S. S. S. S. S. S. S. S. S. S. S. S.			Ministra	n n n n n n n n n n n n n n n n n n n		n nakan kan kan kan kan kan kan kan kan	•	n nakan kan kan kan kan kan kan kan kan		n nen kan kan kan kan kan kan kan kan kan ka	N. N. N. N. N. N. N. N. N. N. N. N. N. N				•						•					The same of the sa	
21 MAXIMUR	0.0033				×			XXXXXXXXXXXXXXXXXXXXXXXX			×	×	1	×		× :		,	×	×:				XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX									
0.040.0	BEVTAYION		AKKKKKKKKXXXXKKKK KK	XXXXXXXXXXXXXXXXXXXX	X X X X X X X X X X X X X X X X X X X	XXXXXXXXXXXXXXXXXXXXX	nkkankanken kalenka	n en ke beere en kerkeren	XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXX	KKKKKKKKKKK	XXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXX	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	XXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	S KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX	NAMES AND PARTICULAR PROPERTY OF PROPERTY	KKKKKKKKKK			XXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX		ZAKKKKKKKK KKKKK					RAKAPBAKAARACERKAKA	***************************************	
MAN INCH	STANDARD BEVIATION	•	AKKKKKK.	. X X X X X X X X X	. KKYKKKK	.XXXXXXX.	. XXXXXXXX	****	NAMARAK.	. XXXXXXXX	XXXXXXXX.	. XXXXXXX	YXXXXXX.	******	- XXXXXXX	XXXXXXXX.	SXXXXXX	******	****	. WKKKKKK	. XXXXXXX			. XXXXXXX	. XKXXXXXX	. XXXXXXX		- XXXXXXXXX					CHARARA	40000000	•
200	RIA.	CHANT	0.00×	.). 093 1	0.001	7.0000	0.00	0.095 2	1 640.0	0.004	3.096 2	0.096	1 160.3	3 247 \$	1 960 0	D.098 \$	1 660.0	0.099 5	3.100. 2	0.100	1 101.0	3.131 0	0.102 0	7.107 2	0.103	3,133 2	0.194 0	R. 104 4	0 501.0	0.105	0.104 0	0.196	0.167	2000	
PATA PRINT		1	5.095						0.64	.0.0%	50000							\$0.00°		i		ી વ. ાગા		51.17		1.0		,0.10°	96	\$6.1.0	34		96		

.

.

THE TAXABLE OF THE PARTY OF THE PROPERTY OF THE PROPERTY OF THE PARTY OF THE PARTY.

TABLE XXXIV

FINAL CAPACITIES

¥
2
2
30
Š
ပ္ထ
-

4000 HOURS

C PLOA MINE LINE	× 1×	¢		0.040.0	21	シュニメマン	0° 1°C29	=	<u>6</u>	KEDIAN	6,0963	
FPG VALUE	0,896) Crywr	2	CANADAC REVI		0.0	1.0030						1
0.691	3.091	-	XXXXXXXXXXXXX	IXXXXX	•	*	:	:	• •	•		
1.0.0	0.032		*XXXXXXXXXXX	KXXXXX								. ~
0.0.0	0.092	_	XXXXXXXXXXXXXXXX	•	<u>:</u>							
D. 0^2	9,093	0									•	
1,000	0.043	4	X KX YX XX XXXXX	. .	XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXX	XXXX	XXXXXX	TXXXXXXX		: !
100.0	669.0	~	*XXXXXXXXXXXX	. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXX	XXXXXX				,		
2.391	0.304	7	* XXXXXXXXXXXXX	_	XXXXXX	KXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		i	:		•	:
3.754	460.0	-	XXXXXXXXXXX	~								
0.094	0.005	٠	XXXXXXXXXXXXX	_	XXXXXX	H K K K K K K K K K K K K K K K K K K K	XXXXXXX	XXXX	XXXXXX	KXXXXXXXX		
900.0	0.095	4	XXXXXXXXXXXX	~	XXXXXX	HINKH HERHEN KANKANKA KAN KENYARKANKAKAKKAKAKKAKKAKKAK.	XXXXXXXX	XXXX	XXXXX	(XXXXXXX)		
550.0	1000	<u> </u> -	XXXXXXXXXXXXXX	~	:	:	:			•		
0.0°6	0.096	ø	* XXXXXXXXXXXXX		XXXXXX	XXXXXXXXXXXX	XXXXXXX	XXXX	XXXXXX	KXXXXXXXXX	n kar sik sik sik sik sik sik sik sik sik sik	KXXXXX
3.7.8	7.0.0	~;	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	_	XXXXXX	XXXXXX						
0.007	7.097	_	XXXXXXXXXXXXXX	~								
76.0.0	7.04R	-	AKKAYPYKKKK.	×	XXXXX	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KKXXXXXX	×				
0.099	0.098	~	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	×	XXXXX	NXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXX	××				
0.000	20.0	4	XXXXXXXXXXXX	•	XXXXXX	HXXXXXXXXXX	KXXXXXX	XXXX	XXXXX	KKKKKKKKKKK	K KKE KKE KKE KEKEL KKE KEKE KEKE KEKE	-:
3.640	0.094	+4	, KYKKYYKKK,	×								
1,000	0.133	- 	YAKKKKKKKKKK	XXXXXX								
0.100	J. 10c	_	* HERRKXXXXXX	CXXXXX				•				
2.100	1.131	i	KANNANNANNAN.	KYXXXXI						•		
0.101	101.	-	*XXXXXXXXXXXX	TXXXXXX								
101.0	201.0	 						:	!			
3.137	1.132		*************	XXXXXX								
0.132	3.133	1~	XXXXXXXXXXXXXX		XXXXXX	KXXXXX						

DELTA CAPACITIES

0.0010 WFD14M 0.0010	**************************************	
11HI MA 0.0000 6 12 MAXI WH 0.0041 STAMBARD DEVIATION 0.0003	NAXAAXXXXXXX	**************************************
301B10	0.003 0.003 0.031 0.031 0.031 0.031 0.031 0.031 0.031 0.031 0.032 0.032 0.033 0.	
SE DATA POTRTS	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	

l i

};

INITIAL CAPACITIES

u
5K
10
30
S
S

·.	-		•				i					KXXXXXX						XXXXXXX	•				•							•	•	•	
												KXXXXXXXX						(XXXXXXXXXX)							•				•				•
	4186-0	1		•								KXXXXXXXXX						KXXXXXXXXX															
	MEDIAN				:	-	XXXXXX					(XXXXXXXXXX	:	XXXXXXX				I X X X X X X X X X X X					•					-			: :		
	*	i .	i i !				KXXXXXXXXX	_				XXXXXXXX		KXXXXXXXXX				CXXXXXXXX															-
	1.0685						XXXXXXXXX	XXXXXXXX		XXXXXXXXX		XXXXXXXXX		XXXXXXXXX				XXXXXXXXXX											:		:		1
URS	21 HAXI 4UM	341			:		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	-	*************************	XXXXXX	HERESHEES HERESHEES HERESHEES HERESHEES HERESHEES HERESHEES HERESHEES HERESHEES HERESHEES HERESHEES HERESHEES HE		KKKKKKADAKKKKKKKAAKKKKAKKKKKKKKKKKKKKK	YXXXX	YXXXXXX	XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		XXXXXXX	YXXXXX			XXXXXXX					!			XXXXXX	:
4000 HOURS	•				!		XXXXXXXXXX			~		XXXXXXXXX	:			XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXX	TXXXXXXXXXXX		XXXXXXXXXXXXXXXXXXXXXXXX		×		************			:					XXXXXXXXXXXXXXXXXX	
	0.4720	staydafn devlation	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXX	!	*XXXXXXXXXXXXX	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	:	XXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXX	:	XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXX	H H F H H H H H H H H H H H H H H H H H	X Y X Y X Y X X X X X X X X X X X X X X	XXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXX			**************************************	************				XYXXXXXXXXXXXXXXX	
B105K	MININIM O	STAYD	XXXX	(XXXX)	C	CXXXX° I	XXXX	* KKKK		CXXXX.	XXXX	S SXXXX	-	· XXXX	CXXXX	XXXX.	CKXXX.	. XXX	CXXXX.	CXXXX.	XYXY.		WXXX	CXXXX.		•	CXXXX	XXXXX				. XYXX	
SCS-301B105K	115 90	0.9845 COUNT	26.0	0.030	0.43\$	7.440	0.945	, O.O.	0.955	0.960	C.455	3.070	0.075	J. 440	0. 115	0.00	3.405	1.000	1.435	1.010	1.015	1.020	1.025	י טגט•ו	1.335 0	1	1.245	153	1.054	1.740	1.064 0	1.070 2	
1 -	PF DATA BUILTS	AN WALUE	0.950	3.974	3.41.	1.935	U+6.4	0.34%	0.44.0	9. 945	1,4601	790.0	0.473	374.0	0.913	5.4.5	2.36.0	טייי ט	1.00.1	1.0.35	1.0.1	1.015	1.020	1.025	1.037	1.035	1.76.1	1.345	1.050	1.755	1.050	1.045	

FINAL CAPACITIES

l iúa.	SCS-301B105K	01B1	05K	4	4000 HOURS	URS				•	
E SATA PERMIT	11175	20	A I I I I	0.9176	17	MON I NOW	1.0590 #	~ '	MEDIAN	0.9734	
741	9.41	13	CTAUNAPH DEVISAL	FULLIA	0.0	0.0343					
€ 10 m	COUNT				:						
3.60.0	0.450	-	***********	XXXXX							
0.49.0	0.925	_	************	XXXXX							
J. 625	0.530	_	. XXXXXXXXXXXXXX	XXXXX							
5 C. C. C. C.	3.03.0	c				1		1			***
2 215	1.365	-	XXXXXXXXX	CXXXXXXXXXXX	XXXXXX	XXXXXXXXXXXX	XXXXXXXXX	*****	******	<u>Van'nakanakanakanakanakanakanakanakanakan</u>	
C#7.0	0. 545	C 1	************	LA F X X X X X X X X X	XXXXXXXXXXXX	XX	:	•	•	į	
7.945	0.050	-	XXXXXXXXXXXXXXX	XXXXX							
. 0.99.6	55,0*0	~	****************	KKKKKKKKKK	XXXXXXXXXXXXXXX	×			!	·	
3.955	3.56.0	-		IXXXXXXXXXX	XXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXX				
C76*C 5	2965	FC .	*XXXXXXXXXXXXXX	*********	CXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	×××	1	!		
A. 865	0.470	4	**********	***********	CXXXXXX	X X X X X X X X X X X X X X X X X X X	KXXXXXXX	KXXXXX	×		
C2 5° C	6150	0									
7.075	3,433	2	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**********	XXXXXXXXXXXX	X					
(0.6° -	0.485	~	************	KXXXXXXXXXXXXX	XXXXXX	X Y X X X X X X X X X X X X X X X X X X	KXX				
57.0.1	0.5.0	-	*************	LXXXXXXXXXXXX	(XXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXX	XXXXXX	 *		
0.000	500.0	~	*************		XXXXXXXXXXXX	**			.•		
500.0	1.030	-	************		XXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXX				
33	1.135	2	*************	IXXXXXXXXXI	XXXXXXXXXXXXX	××					
1.005	1.010	~	*************		XXXXXXXXXXXX	XX					
016.1	516.	-	**********	XXXXX	:	:				•	
, šč	1.723	0							•		
1.020	\$ 0.25	۰	:			***********		:	1		•
1.075	1.030	7	************		XXXXXXXXXXXXX	××					
1.033	1.035	C				i		:			
1.035	1 • 040	~	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	X							
1.06.)	1.045	-	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	CXXXXX	· · · · · · · · · · · · · · · · · · ·		;				
1.045	1.1.50	0									٠
1.050	1.055		XXXXXXXXXXXXX	KXXXX				:			
1.050	1.040	0								•	-
1.080	1.06%	0					•				
550.1	1.070	~	XXXXXXXXXXXXX	XXXXX							

DELTA CAPACITIES

	0.0176 R 49 MEDIAN 0.0071		MUMMUM MINISTER AND AND AND AND AND AND AND AND AND AND	\XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			KKKKXXXXXXX	<u>, kk k k k k k k k k k k k k k k k k k </u>		אאאאאאאאאאאאאאאאאאאאאאאאאאאאאאאאאאאאא	KXXXXXXXXX			<u>Tarahakakakakakakakakakakakakakakakakakak</u>							
4000 HOURS	F 10 KAXTHIS	0,00,0			:				XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KK KKKKKKKKKK T T K KK KKKKKKKKKKKKKKK	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KK K K K K K K K K K K K K K K K K K K	XXXXXXXXXXXXXXXXXXXXXXXXX	KK*KKKKK		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			XXXXXXXX	
105K	1	CTAUNAKIN NEVIATING		* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	*********		*************	. KKKXXXKKXXKXXXXXX	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	*************	• XXXXXXXXXXXXXXXXX	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	. XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	*************		YXXXXXXXXXXXXXXXX	XXXXXXXXXXXX	* * * * * * * * * * * * * * * * * * * *	*XYXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	************
SCS-301B105K	11 SATE	0.0074	COUNT	8 100.0	0.002	0.003	3,000	0.00°	3.338 3	3.937	3.034	7.379	0.010	5 11110	3.712 7	0.013	*10.0	7	P. 116	2 110.0	0.01#
	STAICH ATAR PHI	אבשני מערתנ	1 AU3+	7.037	100%	. 000	160.0	500.0	3,035	× 0.0	. 100-1	5000	0,000	6.0°C	0.013		C 10 C	2.014	Sie's	1 1 1 1	7.017

INITIAL CAPACITIES

4000 HOURS.

SCS-361B405K

-INIMUM 3.4300 # 30 WAXIMUM 4.1260 @ 18 MEDIAN 3.9145	- XXXXXXXXX		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	**************************************	NATIONAL MANAGEMENT OF THE PROPERTY AND AND AND AND AND AND AND AND AND AND	TO THE PROPERTY OF THE PROPERT		. Profichky of the compact of the co	**************************************		**************************************	RECTERANCE.	
47 A7	-6	; c c 	c -	j		ي سه ر	· ·	· •		, - ^	0	۰, ۵	C ~:	
ATO STAT	0.44.	3.443	3.740	3.730	2,470		00.5	6,000	057.6	0.00	4.14.0	6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	4.147	!
MENTA POSTIC	2.4.4.	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	3.720	2.4.0	1,739					(20.4	6.00.0		4.137	

[]

FINAL CAPACITIES

		SCS-301B405K	405K	4000	4000 HOURS					
1,1506	F DATE PO	_	PRESIDE	3.5930 #	MINIXVE OF	6036.4	8 .	MEDIAL	3.3940	
3.560 3.560 3.560 3.760 3.	TO RAINE	! =	T CLACMATO -	さいしょくしゃ さい	9.101.6		-	:	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	. :
3.050 3.750 3.		3.600 -	********		:					
3.75-0 3.75-0	1.60.	A. 25.C. A						•		•
3.740 3.	, FA .	J. 040.	•							
3-6-10 3-7-10 3-		3, (.A.)		: :	: : : :		1 1 1 1 1			
1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	£,64,3	3 1 10								
3.750 3.750 3.750 3.750 3.460 3.460 3.460 3.460 3.460 3.460 3.460 3.460 3.460 3.460 3.460 3.460 3.750 3.	1,430	1.7.1	XXXXXX.							ţ
3.750 3.740 3.460 3.460 3.460 1.030 3.040 3.	(0)	0 057 °C	CHERSHAN .	HERRERATER	THERESTANTANTA	KKK	,		`	1
	740	7.760								-
	() () () () () () () () () () () () () (2 5 7 5 7 3 3 3 4 5 1 3 4 5 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1	. XXXXXXXX	KKKKKKKKKKK	נאנא			;		:
3.460 B2	1.700	ST	XXXXXXXXX.		TX 'X					
3.460 B2 . WWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWW	2.4.3	0 UZM*:				3	> > > > > > > > > > > > > > > > > > > >	*****	*****	XXXXXXXXXX
1.030 1.0 MANAKKKAR 1.030 1.0 MANAKKKAR 1.030 1.0 MANAKKKAR 1.040 1.0 MANAKKKAR 1.040 1.0 MANAKKKAR 1.040 1.0 MANAKKAR 1.040 1.0 MANAKKAR 1.0 MANAKK	666.1	3.440 12	CKHKKKKKK*	X KXY Y X X X X K K K K	KARKARKY KARKAKAN	XXXXXXXXXXXX				
1.000 1 . MENNER MEN MENNER MENNER MENNER MENNER MENNER MENNER MENNER MENNER MENNER MENNER MENNER MENNER MENNER MENNER MENNER MENNER MENNER MENNER ME	. 843	0 01.00								
	C. 7 X 6.	- Oec. 5	XXXXXXXX.		3	,				
1.050 7 . KXXKEREKAYKKE 1.050 7 . KXXKEREKK 1.050 1 . KXXKEREK 1.050 1 . KXXKEREK	1,430	3,4:10 5	. MERKETY		CHAPANAKAKANANA	***		-		
**************************************	1. 300	Q U	ı			3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	* * * * * * * * * * * * * * * * * * * *			
1000 1000	・のハナック	7 036.0	SEXXERIES.		KKKKKKKKKKKKKK	********		•		
######################################	. 40	1.000	SKYXXXX			1				
#	. 36	3.940	STANTAN.		Y X X X X X X X X X X X X X X X X X X X	***				
4.1.00 1 . MKAMKAKA 4.1.00 1 . MKAMKAKA 4.1.00 1 . MKAMKAKA	C.C.B.	6.010 7	. KYNKKYY.							
**************************************	1.010	6 (((**		-						-
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4.020	•	1	XXXXXXX						
1 001.4	4.740	C 2711.4								
1 001.4	4.0.0	4.530	BKKKKKKK.							
	4	1 001.4	. XXXXXXX						•	•

DELTA CAPACITIES

0.045 T		35-00-0 PAINTH 9 9 450144 0.0455	
ا م	STEARISE OFF IAT ION	•	
. Դ	XXXXXXXXXXXXXXXXX	• • • • • • • • • • • • • • • • • • • •	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	. TTEXTENTALENTE THE TEXTERE	HENNINGENERALISE	

<u>,</u>			
ļ	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KARKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	
^	******************	,	
0			:
	* X X X X X X X X X X X X X X X X X X X		
~	**********************	· · · · · · · · · · · · · · · · · · ·	
-	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
Œ	*XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	KHKKYHKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	XXXXXXXXX
~	*******************	~	
٨,	. NAMES SHAMES SHAME AND KARKER	*	
^	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	~	
~	**************************************	**************************************	
00	**************************************		į
7	**************	**************************************	XXXXXXXXXXXXXXXXXXXXXX
0			
4	. KYRYYLXY CHRKKKY CHRKK	PASSES SEE SEE SEE SEE SEE SEE SEE SEE SE	
-	. A TYRC. ARKKE		
0			
-	**********		
0			
-	* NEXTREMENTALLY		
_	**********		
_	. XXXXXXXXXX		• .

INITIAL CAPACITIES

	C		
1 290 0 2 30 0 2	1.246. 2	0.0473 # 34 MEDIAN 0.0452	
2 9-0-0 0 9-0-	0.04.0 0.04.0		
3.044 0.	30.0.0 0.0.0.0		
0.044 0 0 0.044 0 0 0.044 0.0044 0 0.0	0.044 0.044 0.044 0.044 0.044 0.045 0.044 0.	XXX	
0.044 0.044 0.044 0.044 0.045 0.045 0.045 0.044 0.	0.044 0.044 0.044 0.044 0.045 0.045 0.045 0.045 0.045 0.045 0.045 0.045 0.044 0.	XXX	
0.044 0.045 0.	0.046 0.	The same of the contract of the same of th	10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
0.049 0.	0.040 0.	HARMER HERBER EXPERSE OF COCKETS FOR COLLISSION WINES	没有其实的证明,但是是是是是是是是是是是是是是是是是是是是是是是是是是是是是是是是是是是是
		a a a a a a a a a a a a a a a a a a a	lenger tribiter terter
		XXXX	
			:
		1	,
		MANA MANAMANA MANAMANA MANAMANA MANAMANA	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
0.545 3	0.045 0.045 0.045 0.045 0.046 0.047 0.046 0.	XXXXXX	f
0.045 0.044 0.044 0.044 0.044 0.044 0.044 0.047	0.045 0.045 0.045 0.045 0.045 0.046 0.046 0.046 0.047		
0.044 6	0.045 0.046 0.046 0.046 0.046 0.046 0.046 0.047	nananan karaharakara 	
9.045 5 KWWWWKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	0.044 6 WKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK		
0.046 0 NEXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	0.045 0.046 0.046 0.046 0.046 0.046 0.046 0.046 0.046 0.046 0.047	**************************************	31
		NAZKENKKKEKKEKAKEKKKKAKAKAKAKAKAKAKA	
) 30
0.046 3 . MKMKNAKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	0.000 0.0000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.0000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.0000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.0000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.0000 0.0000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.0000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.0	NANGARAN NANGARAN NANGARAN NANGARAN NANGARAN NANGARAN NANGARAN NANGARAN NANGARAN NANGARAN NANGARAN NANGARAN NA	×
3.34.7 3 . WYXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	3.34.7 3 . *********************************		
0.046 1 .xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	0.046 1 .xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	×××	
0.046 1 .xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	0.046 1 .xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	KKKHKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	
0.044 0 0.047	0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 0.0%		
1.047 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1.04.7 0 0 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	,	
0.047 0 0.047 0 0.047 1	0.047 0 0.047 0 0.047 1	****	•
7,047 0 PKAKKAKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	3.047 0 . FXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	•	•
3.047 2 . RRAKKRAKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	3.047 2 . MARKHANKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK		•
3.047 2 . RRAKRYKKKK 3.047 0	3.047 2 . RRAHRRAKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	•	
0.047 0 0.047 0 0.047 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HXXX	
0.047 0.047 0.047 0.047	0.047 0.047 0.047 0.047		
0.047	0.047		
0.047 8	0.067	and the second s	
			•

8CS-361C473K	FINAL CAPACITIES 4000 HOURS A000 HOURS A000 HOURS A000 HOURS A000 HOURS ANATHER BESTATION A D. 0433 & 0.6 MAINUH A D. 0466 & 34 MEDI ANATHER BESTATION A D. 0433 & 0.6 MAINUH A D. 0466 & 34 MEDI A D. 1466 & 3	**************************************
--------------	--	--

The state of the s

DELTA CAPACITIES

×	
E	٠
*	
Ξ	
301C473K	
SCS	
ૹ	

4000 HOURS

22 WEDTAN 0.0005				į	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	<u>-e-e-e-e-e-e-e-e-e-e-e-e-e-e-e-e-e-e-e</u>		naka ka ka ka ka ka ka ka ka ka ka ka ka				LKXAKKAA				-				•								•		
20002 0 00002 0 1 MAXIMUM 0.0015	PR REVIETING		THE TAX TO SELECT THE TAX TO S	KENNYKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	The state of the s		The state of the s			HEXIXXXXXXX HIXXXXXXXXXXXXXXXXXXXXXXXXXX				MXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			·	The second secon				The second secon				人名 化二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十			* XXXXXXX	
5	0.005	r.ngar	A. COO. 4	0.000	2.000	0.000	3.045 12	00000	1000	100.0	100.0		1.000	100,0	2.00	100	1.00.	0.011 0	0 166.A-	0 166.0	0.101	0.031	3.501	0.031	0 160.6	0.001	c.noi	11.	ñ. 402 1	
	THE WALDS	בנים שני	0.00	5.037	0.03	1.000	3.433	000	ספים ר	0.001	1,00	2.001	- · ·	100.0	0.0	0.001	1.371	0.001	1.38	110.0	1000	1.00.	185.0	יייטו	1,6.5	100.6	14.5.4	0.331	100.0	

MEDIAN INITIAL CAPACITIES 0.3469 TABLE XXXIV 39 MAXIMEN 39 0.0163 \$000 HOURS STRUMENT OF STATE OF XXXXXXXXXXXXXXXXX . HYNDRYKKKKKK. XXXXXXXXXXXXXXXXXXX HINIPUR SCS-301C334K 3, 140 5.330 7.163 記 9.341 0.314 STHICA STAR C. 365 3.444 345

Section 1

FINAL CAPACITIES

4000 HOTRS		
SCS-101C11CE		
SUS		

	DC0-201022	くっつい	5r	#000 H 000 KB	•			. •	-
DATA Prints		I	1 1001 0 HENNE	MIMIXEN OF	0.3429	5	HED I AN	0.3251	
ATTA A	0,324,7 C.3UMT	Dr. T. L.	MULATIANO NATUR	0.0103	•			1	
3, 1,50	0.102	XXXX.	XXXXXXXXX						
611,6	90.30	XXXX ·	XXXXXXXX		:	1	:		
2.5	n. the	0							-
0,306	0.348	3 .XXX	~	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX					1
1.134	011.0	XXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			•		
0.310	3.112	0		3			; :	•	
216.0	9.314		. Karranneri karazak	***				: :	
	916		******		!	j			
0		TYTY >		I H H H H H H H H H H H H H H H H H H H	XXXXXXXXXX	XXXXXX	CKKKKK		
6 (1)	37.	0		1		3	3	*************	KKKKKKKKKKKK
3,322	A. 324	S . KKK	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	I K K K K K K K K K K K K K K K K K K K	*******	****	****	(nakalaka ekakakakakakaka ekakakakakaka eka erakaka ekakaka eka eka eka eka eka eka ek	
3.174	36.5.6	0			7	****	*********	MENSULATION MAINTAIN AND MAINTA	
3.4.6	Acres 6	T RXX	**************************************	******************	*********	*****	CHANKKKKKKKK	KEMMINENTAMENTAMENTAMENTAMENTAMENTAMENTAMENTA	*
2000	J. 3 TO	. XXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX						
(1100	25.2	0	THE PARTY AND AND AND AND AND AND AND AND AND AND	**************************************	KXXXXXXXXX				•
7.5.0		•							-
	1.138	3 KXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	HHEEKKE KYKEKKEKE					
A. S. S.	3. 243	TXX.	HKEHKKKKKK	:				:	.#
7.46.)	7.362	0		1			•		
n. 34?	0,344	3 PXXX	XXXXXXXXXXXXXXX	A H H H H H H H H H H H H H H H H H H H			•		•
									-
					:				

DELTA CAPACITIES

	11 MEDIAN 0.0044			karakannan marakannan makannannannannannannannannannannannannan	NAMED AND AND AND AND AND AND AND AND AND AN	K-ckkinkkinkkinkkinkkinkkinkkinkinkinkankankakakaka				•													•	•
4000 HOURS		00.	# # # # # # # # # # # # # # # # # # #	**************************************		ž	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		1							· · · · · · · · · · · · · · · · · · ·	* * * * * * * * * * * * * * * * * * * *		e a la vaga e i la la vagaganta mari i e i i i			***************************************		· · · · · · · · · · · · · · · · · · ·
SCS-301C334K	4 (۶	0,0049 COUNT	7.332	THERMANN O CO C	: :		•	******* C 000 0	0	3.011 3	0 015	0,013 0		0 -10.0	0 210.0	0 0	0.010	1	0 120.0	5 VIC.	1,176	Decide D STREET	イン・大き 一番 イル・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・	
	NE OF DATA POTNIS	di iva ne io	10.0.0	7.002	0.00 C	7.314	0.00%	700.0	0000	0.010	110.0	0.013	111.0		-2	İ	•		0.00			7 C C		

INITIAL CAPACITIES

	1.0293 4 3 MFDIAN 0.9699			The second secon	××	NA NA NA NA NA NA NA NA NA NA NA NA NA N		THE TOTAL TO		MANDER AND AND AND AND AND AND AND AND AND AND	THE THE THE THE THE THE THE THE THE THE	**************************************		**************************************	y	HAHABDYKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	HILKFREENHENNENNENNENNENNENNENNENNENNENNENNENN	A CANALAGANA CANALANA	H. CHINE H. M. H. M. M. M. M. M. M. M. M. M. M. M. M. M.	N N N N N N N N N N N N N N N N N N N									
4000 HOURS	•	STATIFIER SEVENTION 0:0276		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		_		XXXXXXX	=	_		. X 4 X X X X X X X X X X X X X X X X X		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	AND HAND AND AND HAND HAND HAND HAND HAN	TARKE KAF KAF KKEF KKEF KKKKKKKKKKKAKKKA	HATTARKYTHRKKRYKKKKK (XIAFFEKKKKKK)	THE STREET AND STREET STREET STREET, S	"XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	ANTERNATION OF ANTERNATION (SXACCERANATER)			, FETTH CO. C. C. C. C. C. C. C. C. C. C. C. C. C.			· AARLAN COTTURAL CONTRACTOR CONT	•		
105K	aral win	STATIONER		XXXXXX	. XXXXXXX	XXXXXX.	. YXXXXX.	XXXXXXXX	XXXXXX*	XXXXXXX		-XXXXXXX		XXXXXXXX.	. AXXXX.	Y CXXXXX	TEXTENT.	. Nerery	PARETY.	. ANYMAN						. X K K K K K	,		
SCS-301C105K	50	0.9776	1	30 2	16 2		45 1	50 6	55 4	50	65 0	7 01	0 71	٠ 0 د	(14 2)	30 5	1.5	90	35	٠. ٠.	ر د .	-	- 5/	c	15 0	-			
SCS	Poliits		1000	0.430	916.0	1,740	0.045	050.0	13, 155		70.05 C	0.3	276.0	CAL C	yilu "C	Oct. 6	500.0	1.000	1.105	· · · · · · · · · · · · · · · · · · ·	1.115		1. 1.4	·	1.114	646.1			•
	NO OF OSTA POLITS	-	L	3.025	0.030	11.735	0.040	1.145	7.950	3,165	. J. 94.	0.045	1.97	1,975	(int'c	\$ 1 1 ° C	C110 10	-	-	- - 74	-	· 10 · 1	(/ C - - - - - - - - - -	1.77.	(10)	510.1		aus Mái	

FINAL CAPACITIES

0	
40	
•	
V	
- 12	١
ď	١
05K	
_	
₹.	١
30	۰
~	
•	ı
- 11	
טע	
_	
U	

,,
COURS
Ξ
•
ı
I
I
4000 H

4000 HOURS	MINIMIN 0.9199 # 46 4AXIXUM 1.0284 # 3 MEDIAM 0.9609	**************************************	**************************************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	COCCOCCOCCOCCCCCCCCCCCCCCCCCCCCCCCCCCC	TARICA ARACA MARKA CARACA CARA	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	**************************************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		•	, y a grand and a		・ 「「「「「」」」、「「」」、「」、「」、「」、「」、「」、「」、「」、「」、「」		
SCS-301C105K	95,46	3, 120 3	0.775 0	0.935 1	0.040	1.150 6	2.040	1.065	2 611.1	0.475	9.4.10 5	0.235		000	115		115	0 621	2	٠ رز د	; ;
SC	POINTS	وا						•			; } :	C.	Ξ.				. .	<u>.</u>	-	-	}
	SINIUD VITO UNINES	FRCH 0.915	0.920	0.630	7,935	3.345	442	0.940	496.6	010.0	1,175	01.6.1	•	27	5		1.01	16.1	1.17.	1.00	

TABLE XXXIV

DELTA CAPACITIES

		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	· · · · · · · · · · · · · · · · · · ·		:				•	-
	0.0000	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX					1			•
	WF01A			•			•			
	~	CXXXX			:		;	•	i	
	0.080.0	XXXXXXXXXX		:	:		;			i
4000 HOURS	8 5 HAXIMUM									
4	0.0000 VIATION	XXXXXX	33					1		•
05K	STANDA 0.0030	**************************************	. * * * * * * * * * * * * * * * * * * *	*XXX	****	. X 4 X X	****			f ·
01C1	50.010.0	17		0 4	o -	- C	c - r	6 3	c -	1 :
SCS-301C105K			0.020	5.030 0.030	0.75	0.045	0.040	276.0	0.000	4
	NO OF DATA DOTATS	7. 10 0.030 0.036	0.013 0.015			!	0.056	790.0	0.000	
i de la companya de la companya de la companya de la companya de la companya de la companya de la companya de	C N		-		director	* 2 0-21			-276	-1

contained. Random samples were chosen for each measurement interval and the Delta C for each group was determined by comparison with the initially read capacity for each part and calculated by the computer as programmed. All parts were found to be satisfactory thru the 4000 hour readout.

3, 11, 10, 1 Capacities at the 5000 and 8000 Hour Readouts

Tables XXXV, XXXVI and XXXVII covering the initial capacities, 6000 hour readout capacities, and delta capacities computed respectively indicated that all parts continued to be satisfactory. The 8000 hour readout disclosed failures which had occurred between 6000 and 8000 hours.

3.11.11 Analysis of Capacitors at the 8000 Period

At the 8000 hour readout, measurement of the 50 random samples of each part, 100 samples per oven, disclosed failures as listed:

Oven #*	High Dissipation Factor	Low Insulation Res.	Open
1	9	15	
2	7	6	3
3	27	1	

*See 3, 11, 7 for a listing of capacitor values in each oven.

An analysis of the failed capacitors and a preliminary investigation of over operation led to the conclusion that the temperatures

INITIAL CAPACITIES

-		**************************************	•
	0.0969	, x x xxx x xxx x xxx x xxx	
	MEDIAN	**************************************	
	39	XX XXX W XX XXX XX XXX XX XXX XX XXX	
•	0.1070	XX XXX XX XXX XX XXXX XX XXXX XX XXXX	
	0.1	XX XXX XX XXX XX XXX XX XXX XX XXX	
Ŋ	27 MAXIRUM 0.0037	**************************************	
6000 HOUR	200	**************************************	
9009	0.0910 DEVIATION	**************************************	
~	MINIMUM 0.0910 STANDARD DEVIATION	**************************************	
B104F	50 0.0971	こよらきょらりらうううまままらりょ	
SCS-301B104K		CDUNT 0.092 0.093 0.094 0.095 0.096 0.097 0.101 0.102 0.105 0.105	
SC	NO OF DATA POINTS MEAN VALUE	-548 -548	•
•	Z	210	

INITIAL CAPACITIES

	•				<u> </u>))))))	<i>***********************************</i>								
	0.9787		,	**''**	XXXXXXXXXXX		1	****								
	MEDIAN			****** *****	XXXXXXXXX	XXXXX		XXXXXXXXX								
	•			X	XXXXX	XXXX		××××								
	1.0767			****************	***********	(XXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXX	***********									
OUKS	13 HAXIMUM 0.0379			KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	******	<i>tananananananananananananananananananan</i>	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	******			хххх	X X X X X X X X X X X X X X X X X X X			XXXX	
6000 HOUKS	50 MINIMUM 0.9173 #	XXXX			X	KKKKKKKKKKK	XXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXX		<i>XXXXXXXXXXXXXXXXXXXXX</i>	XXXXXXXXXXXXXXX	XXXXX	XXXXX	*****	XXXXX
×	MINIMUM STANDARD		*********	XXXXXXXXXXXX	***********	. KXXXXXXXXXXX	. * * * * * * * * * .	************	**********		XXXXXXXXXXX	XXXXXXXXXXX	. XXXXXXXXXXX	, XXXXXXXXXXX	. XXXXXXXXXXX	,
B105	50 0.9876 NT	- 0	o -	.	ν α	S.	4	ac)		0	2	•		-	2	~
SCS-301B105K	οž		0.940	0.950	0.970	0.980	0.000	000.1	1.010	1.020	1.030	1,040	1.050	1.060	1.070	1.080
	NO OF DATA POINTS MEAN VALUE FROM: TO COL	016.0	0.923	0.940	0.450	0.970	084.0	266.0	1.000	1.010	1.020	1.930	1,040	1.050		279

-279--

INITIAL CAPACITIES

SCS-301B405K N. VALUE DATA POINTS 3.8905 3.676 3.700 3.700 3.710 3.720 4.720 4.700	5K 6000 HOUKS	MINIMUM 3.6990 # 20 MAXIMUM 4.0930 # 37 MEDIAN 3.8935	. THE KENERHER HER HER HER HER HER HER HER HER HE				. *************************************			YXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		**************************************		**************************************		. YXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX				. HANNERSKAN	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK		HXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		*****	nanaanakanakanakanakanakakakakakakakaka	. אאאאאאאאאאאאא		さくとと かいとうせん アンドゥ アンドゥ アンドゥ アンドゥ アンドゥ アンドゥ アンドゥ アンドゥ		**************************************	X X X X X X X X X X X X X X X X X X X			. DEKEKRHHHHHHH					TAXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
	B405	50¢	. 2	o	0	0 1	•	0	٥.	٠,	-4	0 v	0	-	7	4	0	၁	-	~.	~	Ľ۱	_	0	~	4	-	۵.	* ~	۰,	۰ ۳	` ~	0	c	,,	0	0	0	0	!	-	
	SCS-301	S 3.	3.700	3.710	3.720	3.730	3.140	3.750	3.760	3.770	5.183	3,790	3.810	3.820	3.630	3.840	3.850	3.860	3.870	3.880	3.890	3,900	3.910	3.920	3.930	3.940	3,950	3.360	0/5.5	000	000.4	4.010	4.020	4.030	4.040	4.050	4.050	4.070	4.080	060.4	•	
-280-	· ·	OATA VA'L	6	3,7:10	5.710	3.720	3.730	3.740	3.750	3.160	3.110	3.780	3.800	3.810	3.820	m	<u>~</u>	.	_	3.870	3.880	3.640	3.400	3.910	3.420	3.930	3,940	3,950	3 070	000 6	1.00.5	4.000	0:0.4	4	:	070.4	0.50.4	4.050	0.70.4	080**	060° 9	

INITIAL CAPACITIES

3K 6000 HOUKS	HINUM 0.0433 # 42 MAXIMUM 0.0470 # 26 MEDIAN 0.0453	XXXXXXXXXXXXX					KXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX				. Hakanakakakakakakakakakakakakakakakakaka		::xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx		HXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	. H.K.K.K.K.K.K.K.K.K.K.K.K.K.K.K.K.K.K.	Canarararararakara								. THE HAND STAND S	**************************************	CHARACARACARA	. אאאוניאאאאאא		. KKXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		HAXXXXXXXXX				. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	·
C473	50	7	0	0	0	0	'n	7	-	0	٥	m	~	٥	-	~	~	m	~	0	0	4	m ,	0 (> 0	·-	ı v	2	-	~	•	۳	0	-	0	0	0	2	
SCS-301C473K	POINTS 50	0.043	0.043	9,000	9.044	4,0.0	740.0	950.0	950.0	0.044	9.044	4+0-0	550.0	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.046	0 40	0 4 0 0 0 0	0.046	0.046	0.046	950-0	950.0	9,0.0	0.047	0.047	0.047	6.047	0.047	0.047	
S	ND OF DATA PO MEAN VALUE SPOM TO	0.043	0.043	0.043	0.044	0.044	950.0	9.000	750.0	550-0	770.0	350.0	770-0	0.044	0.045	0.045	0.045	0.045	0.045	0.045	6.045	0.045	0.045	5,0.0		0.00	0.046	0.046	9.046	950"0 .	0.046	9*3*0	0.046	0.047	0.047	0.047	0.047	0.047	

A Commence of the second secon

INITIAL CAPACITIES

6000 HOURS

SCS-301C334K

0.3310

MEDIAN

0.3539 46 MAXIMUM 0.0127 CKRKRKKKKKKKKKKKKKKK M. 41 MUM 0.3024 STANDARD DEVIATION ************* ********* CKKKKKK NO OF DATA FORNTS 0.324 -282_

CKKKKKKK *******

INITIAL CAPACITIES

K 6000 HOURS	MINIMIM 0.9331 # 24 MAXIMUM 1.0683 # 45 MEDIAN 0.9875	***************************************	,	**************************	***************************************	**************************************	**************************************	_XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	TYYXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	,×××××××××××××××××××××××××××××××××××××	, XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	**************************************		CHARKERRAKKKKKKKK		. ************************************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	_XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		· CXXXXXXXXXXXXXX			. Takakkakakakakakakakakakakakakakakakaka					
C105	50 0.9869 JNT	-	-	7	۳	~	7	7	~	2	.•	0	S	4	S	~	٥	m	m	7	0	-	0	O	~	0	0	0	~	
SCS-301C105K	=	0.935	0.940	0.945	0.950	0.955	396.0	396.0	0.971	0.975	0.980	0.985	0.990	966.0	1.000	1.004	1.010	1.015	1.020	1.025	1.030	1.03;	1.04	1.045	1.05	1.05	1.06	1.06	1.070	
	NO OF DATA POINTS MEAN VALUE FROM TO CO	930	0.935	0.940	576.0	0.950	0.955	096*0	0.965	0.970	0.975	086.0	0.985	0.090	0.445	1.000		1.010	1.015	1.020	1.025	1.030	1.035	1.040	1.045	1.050	1.055	1.060	1.065	

FINAL CAPAC TIES

6000 HOURS

SCS-301B104K

5C M NIMUM 0.0899 # 45 MAXEMUM 0.1049 # 39 MEDIAN 0.0953		0	2 .XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	2 .××××××××××××××××××××××××××××××××××××	3 "KXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	יאאאנאאעאעאעאעא	1 . WXXXXXXXXXXXXXXX	1 KXXXXXXXXXXXXXXX	**************************************	S CKXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	S - S	3 , CKXXXCLXXXXXXXCXCXXXXXXXXXXXXXXXXXXXXXX	2 . (xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx		2 (XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	1	2 JAXXERKAKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	1 KAKKKAKAKKKKKKK	2 . CKXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	1 Ganarananananananananananananananananana	2 JXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	2]	. (xxxxtxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	0	1	•	0	0	
0.095	0.00.0	0.091	0.091	0.032	260.0	0.092	0.093	0.093	960.0	960.0	6.095	0.095	910.0	0.038	0.097	0.047	0.093	0.098	0.039	660.0	0.100	0.100	0.101	0.101	0.102	0.102	103	0.103	0.104	0-104	105
STNIO9 1		0	0	0	3	0	0	0.	0	0				ċ	0		ċ	0	0	•	ं	0	•	o.	Ċ	0	0	ં	0	c	Ċ
NO OF DATA POINTS MEAN VALUE	060	0.040	0.091	n. 091	260.0	0.092	0.092	6.093	0.093	760.0	0.094	0.095	0.095	960.0	960.0	160.0	160.0	0.090	0.098	0.099	0.099	0.100	0.100	0.101	101.0	0.102	0.102	0.103	0.103	. 0.104	901.0

TABLE XXXVI

FINAL CAPACITIES

6000 HOURS

SCS-301B105K

M NIMUM 0.9932 # 13 MAXIMUM 1.0774 # 4 MEGIAN 0.9734 '	VANDARD DEVIATION 0.0389	******			_XXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************		_XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	HEREKEREKEREK INTE	. HERKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	HAKKKKKKKKKKK		Henrengerhenger		HANANAKAKAKKKK	HANNANA	KKKKKKK	HAKKKKKAKKKKKK	- CANANANANANANANANANANANANANANANANANANAN
20		~	0	0	4	9	9	ഖ	7	10	7	0	7	7	~	~	-	7	-
INTS	0.9812 COUNT	0.910	0.920	0.930	0.940	0.950	0.960	0.970	0.980	0.440	000.1	010.1	1.020	1.030	1.040	1.050	1.060	1.070	1.080
NO OF DATA POINTS	MEAN VALUE FROM TO	006.0	0.910	0.920	0.930	0.940	0.950	096.0	0.970	086.0	0.990	1.000	1.010	1.020	0.0.1	1.040	1.050	1.060	1.070
ž	! 								. —							-	2.	85	· -

-285- .

FINAL CAPACITIES

6000 HOUKS	MUN 3.6240 # 10 MAXIMUM 4.0600 # 37 MEDIAN 3.8590	Č		***************************************		*****	******	******	,	X:xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	X KARAKAKAKA	XX XXX XX X X X X X X X X X X X X X X	**************************************	******	***************************************	**************************************	**************************************	***************************************	********************	**************************************	*******************************		אַלאוא אַנאַלינעץ אַ אַ אַראַא אָלאַרעץ אַל	*******		KKKKKKKKK	
·/	NOMIN:	! TANDARD		XXXXXXXX.		XXXXXXX	. KXXXXXX	XXXXXXX	, TKKKKKK	XXXXXXXX.	XXXXXXXXX	CKXXXXX	XXXXXXX)	CXXXXXXX	****	XXXXXXX.	XXXXXXX.				CXXXXXX		XXXXXXXX	CXXXXXXX		CKKKKKKK	
34051	20	. 20		2	0	-	~4	-	~	m	~	Ś	'n	_	2	m	Ð	4	~	4	m	J	, -1	-	ာ	-	
SCS-301B405K	INTS	3.8450	COUNT	3.640	3.660	3.680	3.700	3.720	3.740	3.760	3.780	3.800	3.820	3.340	3.869	3.840	3.900	3.920	3.340	3.960	3.980	600.5	4.020	4.040	4.760	6.089	
S	NO OF DATA POINTS	MEAN VALUE	FROM TO	3.620	3.640	3.660	3.680	3.700	3.720	3.740	3.760	3,780	3.800	3.820	3.840	3.860	3.380	3.900	3.920	3.940	3.960	3.980	4.000	4.020	4.040	4.060	
	_	:																	- 4	8	6.	٠.					

FINAL CAPACITIES

	6000*0											<i>xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx</i>																			
	MEDIAN										×××	:xxxxxxxxxxxx																			
	0.0029 # 13										(XXXXXXXXXXXXXXX	(<i>\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ </i>																			
OUKS	AXINOM	0.0004					XXXX	KXXXXXXXXXXXXXX	XXXX		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	********																			
9000 HOUKS	9.0001	STANDARD DEVIATION			XXXXXXXXXX	*******	××××××××××××××××××××××××××××××××××××××	XXXXXXXXXXXXXXXXXXXXXX				XXXXXXXXXXXXXXXXXXX																			
X	HOAIN, H	TANDAR	XXXXX	;	XXXXX	XXXXX	XXXXX	XXXXX	XXXXXX	XXXXX	XXXXXX	XXXXX	XXX XXX	XXXXXX	XXXXXX	****	-	•													XXXXX
:473	20	600	-	0	7	~	*	ďγ	4	•	0	15	-	-	-	-	0	c	٥	С	0	٥	0	0	0	0	0	0	0	0	-
SCS-301C473K	INTS	0.0009	00000	0.000	000.0	000.0	0.001	0.001	0.001	0.001	0.001	0.001	0.001	100.0	0.001	0.001	0.002	9.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.003
S	NO OF DATA POINTS	MEAN VALUE	000	0.000	000.0	000.0	000.0	100.0	0.001	0.001	0.001	0.001	100.0	0.001	0.001	0.001		200.0	0.002			0.002	0.002	0.002	0.002	0.002	200.0	0.003	0.003	6.003	C.003
i iliya a	æ Im	: <u>:</u>			5. 1. 1					ul.	3 E\		/3.E	.		Z ar	عادن	- 2	8	7			-	•		- the state	***	٠			

TABLE XXXVI

FINAL CAPACITIES

ţ	1)
	Y	;
1		j
1	-	:
3)
	1	3
		•
1		?
1	9	2
4	٦	2
	4)
	Ų	,
	,,,	;
	5	,
	7	_
		٦,
	ζ)
	2	1
		د
	~	•
		_
	ひくし	' ?
	Ĺ	ر
	U	Ω

HOUTHUM 0.2993 # 46 MAXIMUM 0.3497 # 7 MEDIAN 0.3277 Frandard Deviation 0.0126	נאאאאאאאאאאאאאאא		**************************************		•	xxxx xxxx		CKKKKKKKKKKKK		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	CKKKKKKKKKKKKKKKKXXXXXXXXXXXXXXXXXXXXXX	:	KKKKKK).	- :	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	. KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK		. CARAKAKAKAKAKAKAKAKAKAKAKAAAAK			CHHHHHHHHHHHHHHHHHHHHHH	3 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7				CHANKKK	
50 0.3250 set	۴	0	٣	0	0	_	0	7	0	-	12	0	-	٥	2	10	٥	Ś	0.	0	4	0	\$	0	٥	-	
	0.300	0.302	0.304	0.306	905.0	0.310	0.312	0.14	0.316	0.318	0.320	0.325	0.324	0.326	0.328	0.330	0.332	0.334	0.336	0.338	0.340	0.342	0.344	0.346	0.348	0.350	
NO OF DATA POINTS MEAN VALUE FROM TO CO	367	0.300	0.302	0.304	0.305	0.308	0.31.0	0.312	0.314	0.316	0.318	0.320	0.322			626.0		0.332	0.334	0.335	0.339	0.340	0.342	0.344	0.346	0.348	

FINAL CAPACITIES

6000 HOUKS

SCS-301C105K

MINIMUM D.9004 # 43 MAXIMUM 1.0382 # 49 MEDIAN 0.9700	, THERESTANKE			THE TAX TAX TAX TAX TAX TAX TAX TAX TAX TAX	**************************************		, KAXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		רינאגאנענענענענענענענענענענענענענענענענענע	CKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	ָּרַאַאאאאאאאי.	CKYKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	, XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	,	, (XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		. CEREXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		**************************************	. CAKAKAKAKAKAKAKAKAKAKAKAKAKAKAKAKAKAKAK			THE SECTION OF THE SE	, (<i>אאא אא א</i> א אא אא אא אא אא א א א א א א א				
50 0.9723	•4	0	0	-	-	0	~	4	7	2	~	٣	2	•	-	2	0	~	0	~	~	0	~		7	0	0	~	
_	0.905	0.910	C. 915	1.920	0.925	0.930	0.935	0.940	0.945	0.950	554.5	0.960	0.965	0.470	(.975	086*)	6.985	0.990	0.995	1.000	1.005	1.010	1.015	1.020	1.025	1.030	1.035	1.049	
NO OF DATA POINTS MEAN VALUE	00	506.0	0.910	0.915	0.920	0.925	0.430	0.935	0.940	546°0	0.950	0.955	0.963	596.0	026.0	. 526.0	0.783	586-0	C64.0	364.0	1.000	1.005	1.010	1.015	1.029	1.025	1.030	1.035	

DELTA CAPACITIES

6000 HOUKS	0.0000	RD DEVIATION 0.0007	**************************************	×	. TRKKKKKKKKKKKKK	:			- X X X X X X X X X X X X X X X X X X X	**************************************		. «************************************			. ************************************		**************************************	. ************************************					**************************************		><	\ X X X X X X X X X X X X X X X X X X X		, KKXXXXAXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX									- CANALINEANANANANANANANANANANANANANANANANANANA	
104K		12	2	2	7	0	~	m	7		2	•	s	7	2	4	٣	2	0	_	-	-	-	ى		-	0	-	-		0	0	٥	0	0	c		
SCS-301B104K		0.0012 COUNT	00000	000.0	00000	0.000	0.001	0.001	0.001	0.001	100.0	0.001	0.001	0.001	7,001	100.0	0.007	6.002	0.302	6.062	0.032	0,002	0.002	200.0	0.002	0.002	0.003	0.003	0.003	0.003	0.003	00:0	0.003	6,003	0.003	0.003	\$00°0	
SC	NO OF DATA POINTS	MEAN VALUE FROM TO	2	000.0	0,000	0000	000.0	0.001	0.001	0.001	100.0	C.001	0.001	165.0	100.0	0.001		200.0			200.00	0.002	200.0	0°005	0.002	200.0	0.002	600.0	0.003	0.003	0.003	0.003	0.003	6.003	00.00	0.103	0.003	
							_												, ,																			

DELTA CAPACITIES

6000 HOUKS	M.MINUM 0.0001 # 15 MAXIMUM 0.0149 # 23 MEDIAN 1.0060 TANDARD DEVIATION 0.0042	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			, XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************		**************************************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	********************	. xxxxxxxxxxxxxxxxxxxxxxxxxxxx	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	X X X X X X X X X X X X X X X X X X X	CKKKKKKIKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK		* (********	. ************************************		. XXXXXXXXXX	. XKXXXXXX	X K X X X X X X X X X X X X X X X X X X	. XKXXKKKXXKKKKK	. XXXXXXXXX	HKKKKKKKKKK	* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	X X X X X X X X X X X X X X X X X		**************************************	, KAKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	· Herrenser
B105K	•		ح	~	2	7	c	0		4	~	~	~	~	9	0	~	-	0			€	-	-	~	7	4	0	~	~	-
SCS-301B105K	0.0065 0.0065	0.001	0.001	0.002	0.002	0.003	0.033	0.004	0.004	0.005	900.0	0.006	900.0	0.007	0.007	0.003	0.008	60.00	600.0	0.010	0.010	0.011	0.011	0.012	0.012	0.013	0.03	0.014	710.0	0.015	0:015
S	NO OF DATA POINTS MEAN VALUE FROM TO CO	000	0.001	0.001	0.002	0.002	0.007	0.003	0.004	0.00	0.005	0.005	0.005	0.005	6.007	0.007	0.00	80C.0	0.009	0.00	010.0	0.010	0.011	0.011	0.512	0.012	0.013	0.013	410°0	0.014	0.015

-291. .

DELTA CAPACITIES

15K 6000 HOUKS	M'NIMUM 0.021C # 15 MAXIMUM 0.0946 # 43 MEDIAN 0.0415	ANDRED DEVIATION 0.0193	, sakkakakakakakakakakakakakakakakakakaka			****	**********		**************************************	***************************************	, , , , , , , , , , , , , , , , , , ,		**************************************		. «**********	*************	**************************************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		, , , , , , , , , , , , , , , , , , ,			, x x x x x x x x x x x x x x x x x x x	. KKKKKKKKKKKKKK	. XXXXXXXXXXXXXXXX		XXXXXXXXXXXXXXXX	**************************************		,	*********	**************************************
B 405	20	;	*	~	0	7	~	•	-	4	£	7	-	(-1	_	~	7	~	0	-	0	-	~	-		-			0	Ω		-4
SCS-301B405K		COUNT	0.023	0.025	0.028	0.030	0.033	0.035	0.038	0.040	0.043	0.045	0.048	0.050	0.053	0.055	0.053	0.066	0.063	0.065	0.068	0.070	0.073	0.075	0.078	0.080	0.083	0.035	0.038	060.0	0.043	0.045
<i>3,</i>	NO OF DA'A POINTS	FROM TO	0.020	0.023	0.025	0.028	0.036	0.033	0.035	0.038	0.040	0.043	0.045	6.048	0.050	0.053		29			90.0	0.068	0.070	0.073	0.075	0.073	0.080	0.083	0.085		0.090	£60°0

DELTA CAPACITIES

8400H 0009

SCS-301C473K

M:NIMUM 0.0429 # 42 MAXIMUM 0.0460 # 26 MEDIAN 0.0444 . TANDARD DEVIATION 0.0009					. Sananananananananananananananananananan			, arxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx		CXXXXXXXXXXXXXXX	. Chrkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkkk	. «XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX								. <i>«ХХХХХХХХХХХХХХХХХХХХХХХХХХХХХХХХХХХХ</i>	. KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	. KKXXXXXKKXXXXXXXXXXXXXXXXXXXXXXXXXXXX				. (KXXXKKKXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			**************************************	Caxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx		<i>taaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa</i>
0	-	4	0	~	~	0	0	~	~		4	m	0	0	0	2	0	-	0	٣	٣	~	0	0	S	٣	0	0	_	~		~
POINTS 5-16-16-16-16-16-16-16-16-16-16-16-16-16-	0.043	0.043	0.043	0.043	0.043	0.043	0.044	0.044	0.044	0.044	550°U	0.044	550.0	550.0	550.0	0.044	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.046	0.046	0.046	0.045	0.046	0.046
	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.044	0.044	940.0	0.044	0.044	0°044	9,000	950.0	0.044	950.0	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.046	0.046	9*0*0	940.0	0.046

-293- .

TABLE XXXVII

DELTA CAPACITIES

6000 HCUKS

SCS-301C334K

NINIMUM 0.0006 # 38 HAXIMUM 0.0062 # 34 MEDIAN 0.0040		`*************************************	XXXXXXXXXXXXX		. X F X X X X X X X X X	XXXXXXXXXX	NEKREKKKKKKKKK					. XXXXXXXXXXX	HHHHHHHHHHHHHHHHHHHHHH	XXXXXXXXXXXX	. Kakaxaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa	. X K K K K K K K K K K K K K K K K K K	Ceresesses	KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK	. INTERECTANT TO THE TANDEST TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TOTAL TOTAL TOTAL TOTAL TOTAL TOTAL TOTAL TO THE TOTAL TO	``````````````````````````````````````		. <i>«ДККХХХХХХХХХХХХХХХХХХХХХХХХХХХХХХХХХХХ</i>	CXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		HAKKKKKKKKKKKK	**************************************	, XXXXXXXXXXX			CHRRIXIBERKERK
0		7	~	0		: ~	-	0	0	0	0	_	~		4	4		~	9	ø,	۰.	~	0	0	-	1		٥	0	_
2,500	, L Z	100	101	101	700		201	200	200	200	201	003	600	500	103	03	400	104	104	704	500	505	105	900	50	500	900	900	900	900
	COUNT	00.0	0.00	0.001	0.001	0.001	0.002	0.002	0.002	0.002	6.002	0.003	0.003	0.003	0.003	0.003	0.004	400.0	C.004	0.004	0.004	0.005	0,005	0.005	0.005	0.005	0.006	0.006	0.006	900.0
NO OF DATA POINTS	FROM TO	0000	0.001	0.001	00.0	0.001	0.001	0.002	0.002	0,002	200.0	0.002	0.003	0.003	0.003	0.003	0.003	\$00°0	500.0	,00°0	0.004	0.004	0.005	0.005	0.005	0.005	0.005	0.000	900.0	900*0

DELTA CAPACITIES

8900 HOUKS

C.S.301C105K

	XXXXXXXXXXX	XXXXXXXXXX			٠												
. 56	XXXXXXXXXXXX	XXXXXXXXXXXXX				•											
0.0195	XXXXXXXX	XXXXXXXX															
MEDI AN	XXXXXXXXX	CKKKKKKKK	XXXXX	XXXXX	XXXXX												
*	XXXX	XXXX	XXXX	XXXX	XXXX												
•	XXXX	XXXXX	XXXX	XXXXX	XXXX		XX										
0.0805	CKXXXXXXXXXX	(XXXXXXXXXX)	CXXXXXXXXXX	(XXXXXXXXXXXX	KKKKKKKKK	_	(XXXXXXXXXXX)										
5 MAX1MUM 0.0208	**************************************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	**************************************	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXX	XXXXXXXXXXXXXXXXX			XXXXXX					
MENTMUM 0.0001 #	<u> </u>	************************				, X X X X X X X X X X X X X X X X X X X				XXXX		XXXXX	XXXXX	XXXX		XXXX	
REALMON STANDARD	JXXXXXX	XXXXXXX.	*XXXXXX	******	XXXXXX	"XXXXXX"	XXXXXXX	XXXXXXX.	XXXXXXX	, (XXXXXXXXXX),		XXXXXXX	. CAXXXXXXXXX	,		***********	
_	ဆ	හ	~	ĸ	v	~	•	7	æ		0	۸,	~	-4	0	-	•
0.0243 0.0243 0.0243	0.005	00	0.015	0.020	0.335	0.030	0.035	0.040	0.045	0.050	0.055	0.000	0.065	0.070	6.075	. c.080	
MEAN VY S CO	ő	.00	0.010	0.015	0.020	0.025	0.030	0.035	0.040	0.045	0.050	0.055	0,0,0	0.065	0.010	0.075	
• z															- 2	29	•

within ovens 1, 2 and 3 had become erratic and excessive. It was believed that intermittent sticking of the contacts of the temperature controls had occurred. It was apparent that the oven malfunction had occurred between the 6000 hour readout, where all parts were good, and the scheduled 8000 hour readout. Readouts were made on oven 3 at 8284 hours, oven 2 at 8562 hours, and oven 3 at 8942 hours.

3. 11. 12 Oven Inspection

A thorough review and inspection of the oven contents disclosed that many capacitors exhibited external evidence of case plating reflow of solder and blackened and discolored leads and cases due to excessive temperature exposure.

An examination of the rack connectors showed them to be severly distorted due to excessive heat. See Figures 17 and 18. The effect of heat on new connectors of the same type as used in the ovens was evaluated with the following results:

Test Temperature	Result
125°C	no observable effect
135°C	very slight mechanical deformation
145°C	severe distortion.

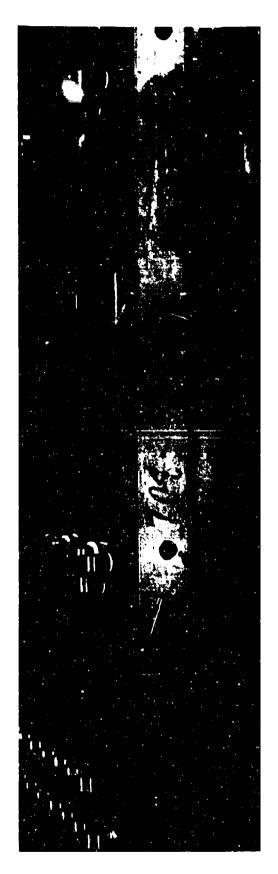
These results indicated that excessive heat had been generated within the ovens with temperatures well beyond the 125°C.



Display of a new connector vs the high temperature damaged connector

Connector Comparison

Figure 17



High temperature damaged connectors as mounted on a typical capacitor test rack

Rack Connectors

Figure 18

setting thus seriously exceeding the temperature vs. life capability of metallized polysulfone film capacitors. The observed failures of high DF, low IR, and opens were consistent with over-temperature exposure of the capacitors.

3.11.13 Test Termination

Therefore, the test was considered as completed with the data taken at the 6000 hour readout for each oven. See Tables XXXV, XXXVI and XXXVII.

3.11.14 Failure Rate for Polysulfone Capacitors

Based on the test of 11,550 capacitors for 6000 hours (see 3.11.13) a failure rate of .0056% per 1K hours at a 90% confidence level was computed using the formula:

$$FR = \left(\frac{(F+1) \cdot 10^5}{Hu}\right) \cdot UC$$

Where:

FR = % per lK hours

F = Total number of failures

Hu = Total unit hours

UC = Max upper confidence limit factor.

The achieved failure rate evidences the capability of metallized polysulfone film dielectric hermetically sealed capacitors to demonstrate a low failure rate under maximum rated test conditions.

This lot failed to achieve the anticipated .002% per 1K hours FR due

to the termination of test with the 6000 hour data readout. One failure was found at the 1000 hour readout (see 3.11.8).

SECTION 4

PROCESS AND CONTROLS

4.1 General

Presented in Figure 19 is the Process and Control Flow Chart applicable to the production and test of metallized polycarbonate and metallized polysulfone film capacitors. This covers the entire process from Receipt of Materials to Shipping of Finished Capacitors. A description of the process steps and controls follows.

4.1.1 Receiving of Materials and Incoming Inspection

No materials are considered as "accepted" until they have been inspected and have been determined to be satisfactory by the Quality Assurance Incoming Inspection Standards.

Quality and inspection criteria have been previously

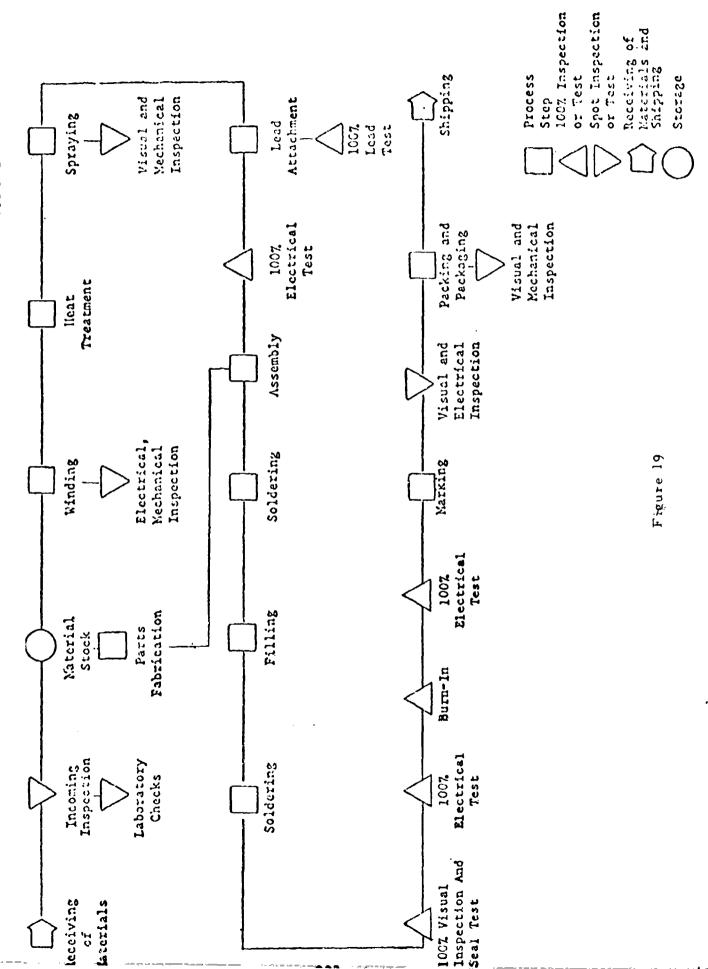
established for those materials common to the hermetically sealed

film capacitor. Included are the electrotinned brass tubes, compression

glass end seals insulating end caps, wire, solders, and potting resin.

Of prime concern is the intrinsic quality of the metallized film in the specific areas of film thickness and uniformity, metal thick-

METALLIZED POLYCARBONATE AND METALLIZED POLYSULFONE CAPACITOKS PROCESS AND CONTROL FLOW CHART



ness and uniformity, margin along one edge, condition of slit edges, width of film, holes, and foreign particles. Of equal concern is the condition of the roll, i.e. alignment of film, number of splices, wrinkles, and protective container or wrapper.

A thorough Incoming Inspection is mandatory if the ultimate goal of a very high quality capacitor is to be achieved.

4.1.2 Storage of Materials

With the exception of the metallized film, all materials are stored in their original containers in a clean, dry storage area. The metallized polycarbonate and metallized polysulfone film must be stored under environmentally controlled conditions in a storage area designed specifically for dielectric films and containing no other materials. Rolls are stored in protective containers, carefully stacked on shelves, in a dust-free, temperature, and humidity controlled area.

4.1.3 Section Winding and Inspection

The metallized film is received in an even number of rolls so that rolls may be paired with one roll containing the metal-free margin on the right and the second roll containing the metal-free margin on the left side. Capacitor sections are made by winding the two layers onto a small diameter mandrel to form a roll or cyliner. During the winding, proper alignment and tension are maintained to insure attainment of a capacitor section having good mechanical and electrical characteristics.

Patrol inspection is conducted by Quality Assurance to verify that the winding operation is being performed in accordance with the applicable specification and that all variables are under control. A sample toll-gate inspection is conducted on each lot of wound sections prior to release of the lot to the next operation.

4.1.4 Heat Treatment

Capacitor sections are placed in suitable containers into a circulating air oven and are exposed to the following conditions:

Metallized Polycarbonate - 20 Hours at 125°C in air.

Metallized Polysulfone - 12 Hours at 150°C in air.

4.1.5 End Spray

Capacitor sections are assembled into holding fixtures and sensitive areas such as mandrel holes and the sides of the sections are masked to prevent penetration by metal spray. The section ends are then sprayed with compatible metal by use of a metallizing gun to form surfaces for the attachment of wire leads. The masking material is removed and the capacitor sections are examined by Quality Assurance to confirm adequate metal end-spray with no penetration of metal into the mandrel hole.

4.1.6 Lead Attachment and Test

The lead wires, which are tinned copper clad steel, are attached to the end spray on the section ends by a suitable soldering or welding technique.

The wire leads are then 100% pull tested to assure bonded connections that are both mechanically and electrically adequate.

4.1.7 100% Electrical Test

All capacitor sections are tested for dielectric strength, capacitance, dissipation factor and insulation resistance. All electrical discrepancies are removed at this point.

4.1.8 Assembly, Seal and Eyelet Soldering, and Filling

The electrically good capacitor sections are capped on each end with an insulating end cap to prevent grounding to the outer metal tube. These sections are then assembled into electro-tinned brass tubes. The compression glass end seals are placed in position and are soldered to the metal tube. One end seal is solder sealed. A potting resin is introduced by vacuum filling with the unpolymerized liquid through the one remaining open eyelet. The open eyelet is then solder sealed to complete the hermetic seal.

4.1.9 100% Visual, Seal and Electrical Tests

The sealed capacitor is cleaned to remove any external residue after the assembly operations.

A 100% visual inspection is conducted under a 3-power magnification to assure that there are no visual discrepancies.

A 100% seal test is then performed consistent with the MIL specification and internal specification.

All capacitors are subjected to electrical measurements and tests consisting of dielectric strength, capacitance, dissipation factor, and insulation resistance. Rejects are removed.

A burn-in consisting of application of 140% of rated voltage for 250 hours at 125°C is performed on all capacitors.

The capacitors are then put through Final Electrical

Testing to check parameters identical to the pre burn-in tests. Those

parts that are satisfactory at this point are ready for the finishing

operations.

4.1.10 Marking

The capacitors are stamped and serialized in accordance with the internal detail specification and with the applicable Military specifications.

4, 1, 11 Final Inspection

Quality Assurance inspection and testing insure that the finished capacitors satisfy all of the specified requirements.

4, 1, 12 Packing and Delivery

Capacitors are packaged in accordance with applicable Military requirements and/or customer Specification Control Drawings.

4.2 Problem Areas

Areas of concern in the manufacture of a high reliability metallized polycarbonate or metallized polysulfone film capacitor include materials and handling. In considering materials, of prime concern is the intrinsic quality of the metallized film in the specific areas of thickness of the film and uniformity of that thickness, thickness of the metallization and uniformity of that thickness, cleared margin along one edge, condition of film along slit edge with particular attention to rough or torn edges. hole defects, inclusion of foreign particles, and amount of residual solvents entrapped. Since the ultimate life of the finished capacitor is to a major extent dependent on the total of these factors, thorough inspection and evaluation is mandatory.

4.2.1 Film Measurement

A sufficient number of rolls of metallized film from each lot as received must be gauged to determine that the rolls and lot are of uniform thickness within acceptable limits. Film with thick and thin areas will produce non uniform sized rolls or sections which may fail dielectric strength tests due to breakdown in the thin areas.

4.2.2 Film Metallization - Thickness

A sufficient number of rolls of metallized film from each lot as received must be checked to determine the thickness of the metallization. The thickness is effectively measured by measuring the resistance of the metallization with the resultant resistance expressed

in ohms per square. Metallization that is too thick will result in capacitors which will not clear properly thus introducing severe degradation as shorts or low insulation resistance. Metallization that is too thin will result in power losses in the high resistance areas leading to hot spots and excessive temperature rise of the capacitor in current carrying applications.

4,2,3 Cleared Margin

The cleared margin along one edge of the roll of metallized film must be adequate to withstand the dielectric voltage stress and prevent flash over or low insulation resistance from the adjacent concentrically wound metallized film. Minimum margin is specified based on the rated and surge voltage rating of the capacitor.

4.2.4 Mechanical Condition

The mechanical condition of the metallized film along the metallized slit edge is of concern since rough and torn edges may result in poor quality lead attachment to the metallization at each end of the capacitor section during the manufacturing phase of end spray and lead attachment. Also such mechanical anomalies may result in damage to or provide conductive paths over the clear margin of the adjacent metallized film comprising the alternate electrode of the capacitor section.

4.2.5 Film Defects

Hole defects and inclusion of foreign particles both can result

in a conductive path to the adjacent film electrode metallization.

Metallized film exhibits a self healing or clearing phenomenon which may occur through weak areas of the film, holes in the film, or conductive included particles. The defect area permits the flow of sufficient current to vaporize the aluminum metallization surrounding the defect area leaving a cleared insulating film margin which in turn causes the current flow to cease. This results in a capacitor which seldom suffers catastrophic failure unlike film-foil capacitors where catastrophic shorts may be the prime failure mode.

4.2.6 Entrapped Solvents

Entrapped solvents, residuals from the basic film manufacturing process, if allowed to remain within the film would result in electrical parameter degradation in a relatively short time. In so far as possible these residuals must be removed from the film in order to maintain a high insulation resistance for the lifetime of the capacitor.

4.2.7 Enclosure

In the case of any high reliability product, protection from the hostile environment in particular moisture and contaminants must be provided. In the case of high reliability capacitor sections, that protection is afforded by inserting the section into a metal enclosure or case solder sealed with an insulating glass-to-metal seal at one or both ends with the section attached leads emerging at both ends of the metal case. To afford protection from the environment of shock and

vibration provision must be made during the assembly process to provide a shock and vibration cushion around the section positioned within the case.

4, 2, 8 Contamination Effects

Contamination during the manufacturing process must be avoided at all times since it does little good to seal off the section from the hostile environment if contamination due to handling of the materials or sections or hardware during production results in the contamination being sealed within the case.

4.3 Work in Problem Areas

4.3.1 Film Thickness

Reference is made to 4, 2, 1. To inspect and accept metallized polycarbonate and metallized polysulfone film which when rolled will result in a section which is of the correct diameter for insertion into the metal case and which will be satisfactory from the standpoint of important electrical parameters, it is necessary to establish criteria for thickness of the film. For this production engineering measure and for the size and voltage rated capacitors incorporated therein the nominal thickness are .24 and .50 mils for 100 V and 200 VDC ratings respectively. The tolerance allowed is minus .02 mils and plus .03 mils for the 24 gauge and ± .05 mils for the 50 gauge. When rolled or wound into a section of multiple turns, the thin and thick areas tend to average out to a predictable resultant section size. The minimum thicknesses of

.22 and .45 mils are adequate to withstand the required voltage stresses both name plate rated and surge.

4.3.2 Film Metallization - Resistance

Reference is made to 4, 2, 2. The ohmic resistance of the metallization affects the performance of the finished capacitors. Thin metallization will result in high ohmic resistance and the I²R losses in the electrodes will cause section heating. Thin metallization increases the difficulty of making low resistance contact to the ends of the section during the end spray and lead attachment process in manufacturing. Poor contact can result in high dissipation factor and even eventual loss of end contact during application life of the capacitor. Thick metallization increases the probability that clearing in areas with low voltage stress capability will be incomplete with inadequate "aportization of metal around punchthrough areas thus making the capacitor susceptable to additional clearings in that same area under added stresses. Incomplete clearing may leave semi-conductive residuals surrounding the punch-through point or area which could result in serious degradation of the insulation resistance of the capacitor. For this Production Engineering Measure it was determined that an acceptable resistance for the metallized film was in the range of 1.0 to 2.0 ohms per square. The process was specified accordingly.

4.3.3 Film, Clear Margin

Reference is made to 4.2.3 Figure 1 showing the typical configuration of the concentrically wound capacitor films discloses

that the cleared margin along one edge of each film provides necessary flash over insulating area between the adjacent films. This also permits the attachment of the end lead to the uncleared edge of each metallized film respectively without the possibility of inadvertently contacting the metallization of the other film which would result in a short circuit of the device. Consequently it was necessary to establish a minimum and maximum on the cleared edge area or width. The minimum selected insured adequate insulation to prevent flash over at maximum voltage stress and the maximum selected would permit winding sections to a specified number of turns resulting in a section with capacitance within the nominal ±10%. It can be observed that too wide a margin would decrease the total active area of the electrodes for a specified number of turns in winding with a low capacity section as the result. For this Production Engineering Measure, the clear margin was specified as .062 ± .02 inches.

4.3,4 Film, Slit Edges

Reference is made to 4.2.4. Acceptable roughness or minute tears along the slit metallized edge of the metallized polycarbonate or polysulfone film is a factor which has been determined through experience gained in working with sate-of-the-art metallized film and manufacturing processes. The inspection performed is subjective based on the experience factor with previous acceptable and unacceptable edge conditions. The inspection may be both visual and tactile. Smooth

edges acceptable for use appear shiny and reflect light whereas rough edges appear dull and reflect much less light. This is best checked by viewing the edge surface of the multiple turns in roll form. Relative smoothness of the edges may be felt by lightly passing the finger over or along the edges. However, to avoid contamination of materials by skin excretions the amount of such handling or tactile inspection must be minimized or such inspection rolls not used for high reliability capacitors.

4.3.5 Film Defects

Reference is made to 4, 2, 5. Defects in the metallized film as received are subjectively acceptable provided that there is not an excessive number observed. In particular, with such films defects occur in two classes: the first is the appearance of pin holes through the film, and the second is included foreign particles particularly those which are semi-conductive. Either of these classes of defects will usually result in a non-catastrophic clearing when the wound section is exposed to a voltage low enough not to result in massive destruction of film and electrode areas but high enough to breakdown or punch-through at the hole or particulate area. Such clearing may typically be accomplished by the application of a voltage approximately 10% higher than the maximum voltage 1° 2 capacitor will see in use or test, and such voltage is applied until the audible "snaps" of the break through clearing are no longer heard or voltage fluctuations of the clearing voltage applied to the capacitor

sections ceases. An excessive number of clearings could result in degradation in insulation resistance or low capacity of the section. In either case the section would be discarded. The visual inspection of the film as received is of necessity subjective. If a hole defect were observed upon unrolling a length of film from the bulk roll, additional lengths of film would be removed and inspected for repetition of the hole which could be indicative of damage caused during the slitting operation at the plant of the supplier. Such repetative holes throughout the roll would be cause for rejection of that roll. However, for the most part, the holes are so small as intrinsic defects and the foreign particles so invisible to usual visual inspection that the clearing specified as a part of the production process for high reliability metallized film capacitors reveals the relative presence of such defects.

4, 3, 6 Heat Treatment

Reference is made to 4.2.6. The trace quantities of residual products of the manufacturing process of the bulk film generally of most concern when the metallized film is wound into capacitor sections are those of the solvent system and absorbed moisture. In so far as possible it is essential that these elements which constitute contaminants in a viable capacitor be removed from the film. Presence of these contaminants could result in low or degraded insulation resistance or short life catastrophic failure of the capacitor, due either to short circuit or

degradation and loss of end termination resulting in an open circuit. In this Production Engineering Measure an effective heat treatment of the wound section was developed by a matrix program of time and temperature exposure. Five (5) test groups comprised the matrix and selection of the best combination of time and temperature ambients was effected on the basis of comparative measurements of the electrical parameters. The heat treatments selected on the comparative basis and engineering evaluation were:

Polycarbonate - 20 hours at 125°C in air.

Polysulfone - 12 hours at 150°C in air.

The times allowed were adequate for entrapped solvents or moisture to work their way out of the film. The temperature of 125°C was consistent with the maximum operating and test temperature of the finished polycarbonate capacitor.

The temperature of 150°C was consistent with the higher temperature capability of the polysulfone dielectric. Shrinkage of the section film was achieved at a sufficiently high temperature so that no additional shrinkage would occur when the finished capacitor was exposed to 125°C for application life or the 10,000 hour test interval. The section heat treatment thus developed was incorporated into the process specification for this Production Engineering Measure.

4.3.7 Mechanical Construction

Reference is made to 4, 2, 7. Long term protection from the ambient environment is necessary to insure long life of the capacitor. In this Production Engineering Measure the required protection was achieved by the assembly of the capacitor section with leads attached into a metal case mechanically in conformance with the dimensions of each part as specified in SCS-301. Glass-to-metal seals were soldered into the ends of the case with the section leads emerging through each insulated metal eyelet respectively. One eyelet was solder sealed to the lead at that end.

To provide the shock and vibration cushion for the enclosed section, the assembly was immersed in a vacuum chamber in a bath of unpolymerized resin and a vacuum drawn. When the vacuum was released the resin completely filled the internal voids in the assembled unit. Capacitors were removed from the bath and the resin in the assembly was polymerized or cured at a temperature of 85°C maximum. After the cure, the remaining open eyelet was solder sealed to the lead. Thus the section was sealed off from the ambient environment and cushioned by the cured resin to withstand shock and vibration.

4.3.8 Radiographic Inspection

High reliability capacitors must be properly assembled with the internal positioning of the section oriented to the can configuration

and good soldering of the seals and eyelets with no foreign particles such as bits of metal or solder included within the case. To assure this, all capacitors were subjected to Radiographic Inspection (X-Ray) of sufficient definition to determine that they were free from such defects. Two views were taken perpendicular to the terminal axis. After the first view, capacitors were rotated 90 degrees for the second view. An image-quality indicator at least 10% smaller than the smallest defect to be detected was included with each exposure. Images were evaluated with a magnifying glass of 10X magnification. Any capacitor with a detected defect was rejected.

4.3.9 Film Handling and Storage

Reference is made to 4.2.8. Metallized polycarbonate and metallized polysulfone films used in high quality capacitors must be protected from contamination at all times since such contamination will result in degradation of electrical parameters and catastrophic failure with time. At all stages of the manufacturing process starting with the film as received and inspected, protection from environmental contaminants including skin contact must be avoided. Film materials are handled with gloved hands during winding and section handling. All film is stored in sealed plastic bags until used in fabrication. In particularly sensitive stages of the manufacture, the operators wear protective dust free gowns and caps. Housekeeping is consistent with and approved under

the requirements of MIL-STD-790 for the control of process for the manufacture of established reliability capacitors and electronic devices.

4.4 Conclusions

4.4.1 Metallized Polycarbonate Capacitors, Military Specifications

Metallized polycarbonate film capacitors manufactured in accordance with the processes and controls delineated in paragraphs 4.1, 4.2 and 1.3 will meet the requirements for Established Reliability capacitors as covered by MIL-C-39022 and SCS-301. The transfer of the basic requirements of MIL-C-39022 and SCS-301 into a viable Military specification covering metallized polycarbonate film capacitors has been accomplished. Much of the parameter limit requirements of MIL-C-39022/10 covering DC rated metallized polycarbonate film capacitors was predicated on the work performed under this Production Engineering Measure. Sprague Electric Company has achieved qualification to the /10 document and the capacitor product envisioned in SCS-301 is available for use in military systems. Refer to Table XXXVIII which is a copy of that slash sheet. In addition, similar metallized polycarbonate film capacitors have been characterized in MIL-C-39022/9 and MIL-C-83421. The Sprague Electric Company is qualified to "P" (a FR of .1% per 1000 hours) level under both specifications. In addition, the Sprague Electric plant is regularly inspected by inspectors of the Defense Electronics

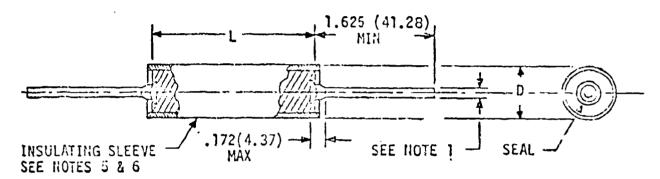
TABLE XXXVIII

MILITARY SPECIFICATION SHEET

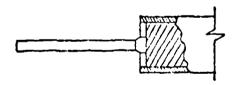
CAPACITORS, FIXED, METALLIZED-PLASTIC FILM DIELECTRIC, DIRECT CURRENT, (MERMETICALLY SEALED IN METAL CASES), ESTABLISHED RELIABILITY

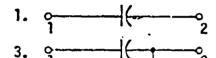
Style CHR10 (insulated)

The complete requirements for procuring the capacitors described herein shall consist of this cocument and the latest issue of Specification MIL-C-39022.



CASE FOR CIRCUIT 1





CASE FOR CIRCUIT 3

CIRCUIT_DIAGRAM_

NOTES:

- 1. Number 24 AMG wire for case diameters of .175 (4.45 mm) and .195 (4.95 mm). Number 22 AMG wire for case diameters of .235 (5.97 mm) and .312 (7.92 mm). Number 20 AMG wire for case diameters of .400 (10.16 mm) and over. (See Table 1 for exceptions.) Number 18 AMG wire: See Table 1.
- 2. See Table 1 for additional dimensions.
- 3. Dimensions are in inches.
- 4. Metric equivalents (to the nearest .01 mm) are given for general information only, and are based upon 1 inch = 25.4 mm.
- 5. Insulating sleave shall extend beyond the canaditor body but shall not exceed .031 (.79 mm) inch on either end. Insulating sleave thickness shall not exceed .016 (.41 nm) inch.
- 6. Plastic insulating sleeve shall be transparent; marking shall be placed on the capacitor case.
- 7. Matric equivalents are in parentheses.

Requirements:

Dimensions and Configuration: See Figure and Table 1.

Case material: Hongragnetic

Capacitance Value: See Table 1.

Capacitance Tolerance: 1 percent, 2 percent, 5 percent, and 10 percent Rated Voltage: See Table 1 for 85°C rating; cerate to 60 percent of

85°C rating for operation at 125°C.

Dielectric material: Hormally polycarbonate.

Operating Temperature Range: -55° to +125°C. Failure Rate Level: M(1.0%), P(0.1%), R(0.01%), S(0.001%).

DC Burn-in: in accordance with MI'-C-39022, Table III, Qualification Inspection, Group 1, and Table IV, Group A Inspection, Subgroup 1, except 140 percent of DC rated voltage shall be applied for 48 hours minimum at +125° +4, +0°C. 100 percent inspection required.

Dielectric Withstanding Voltace (DNV): Method 301 of MIL-STD-202; 100 percent inspection required following DC burn-in.

Terminal to Terminal:

AC: 100 ±10 Hz square wave, beak-to-peak voltage, three times DC rated voltage for 60 seconds minimum, but need not exceed 800 V peak-to-peak. Square wave signal shall have a rise time of 10 to 100 microsecunds and a maximum overshoot of 20% of rated peak voltage.

DC: 200 percent of DC rated voltage for 60 seconds, minimum.

Terminals to Case (when case is not a terminal): Same requirements as specified for terminal to terminal DC DAV Test.

Radiographic Inspection (X-Ray): Method 209 of MIL-STD-202

(Required for FR levels R and S only).

Thermal Shock: Method 107 of MIL-STD-202, Condition A, except Step 3 shall be +125° +4, -0°C.

Seal: Method 112 of MIL-STD-202, Condition A, except at +125° +4, -0°C, I hour with no evidence of leakage.

Insulation Resistance (IR): Method 302 of MIL-STD-202.

Terminal to Terminal - See Table 3.

Terminal to Case (when case is not a terminal) - 50,000 magehrs, minimum.

Capacitance (CAP): Method 305 of MIL-STD-202.

Dissipation Factor (OF):

At 25°C - 0.253 maximum

At 85°C - 0.40% maximum

At 125°C - 0.60% maximum

Table 1. Capacitor characteristics and dimensions

DC Rat		Dimensions, No D +.015,005	
50	.047	.174	.531
	.056	.174	.531
	.068	.174	.625
	.082	.174	.625
	.10	.174	.625
	.12	.174	.625
	.15	.193	.625
	.18	.193	.625
	.22	.235	.625
	.27	.235	.625
	.33	.312	.625
	.39	.312	.625
	.47	.312	.625
	.56	.312	.625
	.68	.312	.843
	.82	.312	.843
	7.0	.312	.843
	1.2	.400	.843
	1.5	.400	.843
	1.8	.400	.843
	2.0	.400	.843
	2.2	.400	1.125
	2.7	.400	1.125
	3.0	.400	1.125
	3.3	.400	1.125
	3.9	.500	1.125
	4.7	.500	1.125
	5.0	.500	1.125
	5.6	:500	1.125
	6.8	.562	1.125
	8.2	.562	1.312
	10.0	.670	1.312
	12.0	.670	1.312
	15.0	.750	1.375
	18.0	.750	1.375
	20.0	.750	1.625
	22.0	.750	1.625

Table 1. Capacitor characteristics and dimensions (cent'd)

DC Rated	Cap Value	Dimensions, N 0 +.015,005	lominal L ±.031
100	.01 .012 .015 .018 .022 .027	.174 .174 .174 .174 .174 .174	.625 .625 .625 .625 .625 .625
	.039 .037 .056 .068 .082 .10	.174 .193 .193 .235 .235 .235	.625 .625 .625 .625 .625 .688 .688
	.15 .18 .22 .27 .33 .39	.312 .312 .312 .312 .312 .312 .400	.625 .625 .688 .628 .812 .812
	-56 .58 -18: 1.0 1.2 1.5 1.3 2.0	.400 .400 .400 .500 .500 .500	.812 .938 .938 .938 .938 .938 1.125
	2.7 2.7 1.0 3.3 4.0 4.7 5.0	.500 .562 .562 .562 .562 .670	1.125 1.312 1.312 1.312 1.562 1.312
	\$.#6 6.31 8:22 71.07	.670 .670 .670 .750	1.312 1.562 1.812 1.812
	12.0 15.0 10.0 10.0	.750 1.000 1.000 1.000 1.000	1.812 1.875 1.875 1.875 1.875

Case size of 1" dia uses #18 AIG leads.

Table 1. Canacitor characteristics and dimensions (cont'd)

DC Rated	Cap Value	Dimensions, No	minal
Voltage	in uf	D +.015,005	L = .031
200	.01 .012 .015 .018 .022	.174 .174 .174 .193 .193 .235	.625 .625 .625 .625 .625
•	.027 .033 .039 .047 .056 .063	.235 .235 .235 .312 .312	.625 .688 .689 .625 .625
	.10 .12 .15 .18 .22 .27	.312 .312 .312 .400 .400 .400	.688 .812 .812 .688 .812 .812
	.39 .47 .56 .68 .82	.400 .400 .400 .500	.938 1.125 1.312 1.125 1.125
	1.9 1.2 1.5 1.8	.562 .562 .562 .562	1.125 1.312 1.312 1.812
	2.0 2.2 2.7 3.0	.562 .562 .670 .750	1.812 1.812 1.562 1.562
	3.3 4.0 4.7 5.0	.750 .750 .750 .750	1.812 1.812 2.062 2.062
	5.6 6.0 7.0 8.2	.750 .750 1.000 1.000	2.312 2.312 1.812 2.062
	10.0	1.000	2.312

Case size of 1" dia for 8.2 mfd and 10 mfd uses #18 fMG leads

Table 1. Canacitor characteristics and dimensions (cont'd)

DC Rated Voltage	Cap Value	Dimensions, No. 1, 005	
400	.01 .012 .015 .018	.2.5 .235 .235 .235	.8;2 .8;2 .8;2
	.022 .027 .033 .039	.212 .212 .72	388 313 313 8
	.047	. 400	.81°
	.056	. 400	.81°
	.068	. 400	.938
	.082	. 400	.938
	.10	.400	1.125
	.12	.400	1.312
	.15	.400	1.312
	.18	.562	1.125
·	.22	.562	1.125
	.27	.562	1.312
	.33	.562	1.562
	.39	.562	1.562
	.47	.562	1.812
	.56	.670	1.562
	.68	.670	1.812
	.82	.750	1.812
	1.0	.750	2.062
	1.2	1.000	1.812
	1.5	1.000	1.812
	1.8	1.000	2.062
	2.0 2.2 2.5 2.7	1:000 1:000 1:000	2.062 2.312 2.562 2.562

Table 1. Capacitor characteristics and dimensions (cont'd)

DC Rated	Cap Value <u>in uf</u>	Dimensions, 1	iominal
Voltage		D +.015,005	L ±.031
600	.01	.312	.812
	.012	.312	.812
	.015	.400	.812
	.018	.400	.812
	.022	. 400	.812
	.027	. 400	.937
	.033	. 400	.937
	.039	. 400	1.125
	.047	.400	1.125
	.056	.400	1.312
	.068	.400	1.312
	.082	.562	1.125
	.10	.562	1.125
	.12	.562	1.312
	.15	.562	1.312
		.562	1.562
	.22	.562	1.812
	.27	.670	1.562
	.33	.670	1.812
	.39	.670	1.812
	.47 .56 .68 .82	.750 .750 .750 1.000	1.812 2.062 2.312 1.812 2.062

^{1/} Dimensions are bare case sizes (see figure).

^{2/} Dimensions are for Circuit 1,__ For Circuit 3, deduct .062" from length.

^{3/} See Table 2 for metric equivalents.

Table 2. Matric Equivalents of Decimal Inches 1/

Inches	MM	Inches	MM	Inches	MM
.005 .015 .031 .175 .195 .235 .312 .400 .500	.13 .38 .79 4.45 4.95 5.97 7.92 10.16 12.70 14.27	.670 .688 .750 .812 .874 1.000 1.062 1.124 1.312 1.374	17.02 17.48 19.05 20.62 22.20 25.40 26.97 28.55 33.32 34.90	1.562 1.624 / 1.812 1.874 2.062 2.124 2.312 2.374 2.562 2.624	39.67 41.25 46.02 47.60 52.37 53.95 58.72 60.30 65.07 66.65

Metric equivalents (to the nearest .01 millimeter) are given for general
information only, and are based upon 1 inch = 25.4 mm.

Table 3. Insulation Resistance

In Megohms:	
At 25°C ±3°C (need not exceed) At 85°C +4, -0°C (need not exceed) At 125°C +4, -0°C (need not exceed)	7250,000 25,000 15,000
In Megohms X Microfarads (minimum):	
At 25°C ±3°C — At 85°C +4, -0°C At 125°C +4, -0°C	100,000 6,000 1,000

Barometric Pressure (reduced): Method 105 of MIL-STD-202, Condition D (100,000 feet). 125 percent of rated voltage applied. See MIL-C-39022 for voltage limitations.

Vibration, High Frequency: Method 204 of MIL-STD-202, Condition D (20G). 50 percent of rated voltage applied.

Salt Spray (corrosion): Method 101 of MIL-STD-202, Condition B (48 hours). Salt solution - 5 percent.

Immersion: Method 104 of MIL-STD-202, Condition C.

DAY:

Insulating sleeves - 4000 VDC, minimum.
Terminal to terminal - 150 percent of rated voltage.
Terminals to case (when case is not a terminal) - 200 percent of rated voltage.

IR:

Insulating sleeves - 100 megohms, minimum.

Terminal to terminal - 60% of value specified in Table 3.

Terminals to case (when case is not a terminal) - 30,000 megohms, minimum.

CAP: Within ±3% of initial value.

DF: Not more than 110% of initial li: ...

Solderability: Method 208 of MIL-STD-202.

Shock (Specified pulse): Method 213 of MIL-STD-202, Condition I. 50 percent of rated voltage applied.

Moisture Resistance: Method 106 of MIL-STD-202.
DNY, IR, CAP, and DF - Same as for immersion.

Terminal Strength: Method 211 of MIL-STD-202, Conditions A and D.

Condition A - Applied force 5 pounds Condition D - 3 rotations of 360 degrees

Low Temperature and CAP change with Temperature:

Low Temperature: -55° +0, -3°C for 48 +4 hours with rated voltage applied.

CAP change with Temperature:

At -55° +0, -3°C: +0, -2% At +85° +4, -0°C: ±1% At +125° +4, -0°C: ±2%

Fault Count: Not applicable.

Fungus: Method 508 of MIL-STD-810, Procedure I.

Resistance to Soldering Heat: Method 210 of MIL-STD-202, Condition B (260 ±5°C for 10 ±1 seconds).

IR: See Table 3

CAP: Within ±3 percent of initial value

DF: Not more than initial limit

Life: Method 108 of MIL-STD-202.

Qualification:

Accelerated Conditions: 140 percent of rated voltage for 2000 +72, -0 hours at 85°C. End of life requirements as specified for rated conditions.

Rated Conditions: 100 percent of rated voltage for 10,000 +96, -0 hours at 85°C.

DF (at 85°C +4, -0°C) between first 24 and 48 hours of test: Not greater than initial limit.

DF (at 85° +4, -0°°C) during last 48 hours of test: 0.8 percent, maximum.

IR:

Insulating sleeves - 100 megohms, minimum

Terminal to terminal - not less than 30,000 megohmmicrofarads or 75,000 megohms

Terminals to case (when case is not a terminal) - 30,000 megohms, minimum.

CAP: Within ±5 percent of initial value.

DF (at +25 \pm 3°C) after Life: 0.5 percent maximum.

Extended Life:

Accelerated Conditions: 2,000 +72, -0 hours.

Ratec Conditions: 10,000 +96, -0 hours.

IR, CAP, and DF - Same requirements as for qualification Life Test. 125°C Verification Life Test: 85°C rated voltage for 2,000 +72, -0 hours at 125°C. 25 pieces representative of production shall be tested every six months.

IR, CAP, and DF - Same requirements as for qualification Life Test.

Marking: In accordance with MIL-C-39022

Part Number: M39022/10 - (Type designation as detailed below)

Explanation of Type Designation:

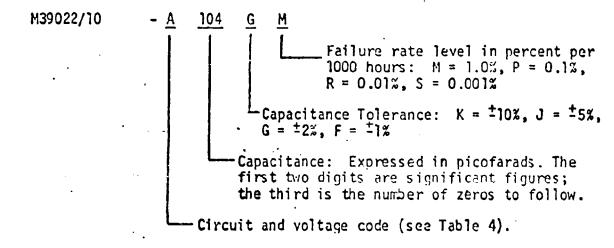


Table 4. Circuit and Voltage Codes

CODE	CIRCUIT	VOLTAGE
A B C D E F G H J K	₩ 1 3 1 3 1 3 1 3	50 50 100 100 200 200 - 400 400 600

Preparing Activity: NAVY-EC

Supply Center, Dayton, Ohio for compliance with the Established Reliability specifications cited, and the Process Control Standard MIL-STD-790, with continued qualification.

4.4.2 Metallized Polsyulfone Capacitors, Military Specifications

The metallized polysulfone film capacitors tested under this Production Engineering Measure exhibited the capability of high reliability as evidenced by the achieved .0056% per 1000 hours failure rate. However, the quality of available polysulfone film continues to be variable resulting in concern for continuous availability of film satisfactory for production use in high reliability capacitors. At this time, there is not a viable MIL specification covering such dielectric capacitors but it is anticipated that such a document will be generated by the Military services and Industry when film availability is achieved and the product need in equipment applications demonstrated. Meanwhile, proprietary product is supplied by the Sprague Electric Company on a custom designed basis for use in Military Systems when OEM specified.

4.5 Process Yields

A breakdown of process yields into losses at each station is presented in Table XXXIX.

Seventy percent of the wound capacitor sections are passed through inspection and are sent to the next operation. Of these, only seventy

TABLE XXXIX

PROCESS YIELDS

Process Step	Loss In Percent
Winding and Quality Assurance Inspection	30.00%
Process Step	Loss In Percent
Heat Treatment	. 05
Prepare for Spray	. 20
Spray	1.00
Clean	. 20
Attach Leads	2.00
Lead Pull Test	1.00
Electrical Testing	12.50
Assembly Enclosures	. 10
Solder End Seals	.30
Fill	. 05
Final Seal	.20
Clean	. 05
Mechanical Inspection	1.00
Seal Test	.30
Electrical Test - Pre Burn-In	6.00
Post Burn-In	5.00
Marking	. 05
Total Assembly Losses	30.00%

percent make it through the manufacturing process. Thus an overall yield of 49% is experienced for the metallized polycarbonate capacitor. The same percentages apply to the metallized polysulfone capacitor.

4.6 Equipment and Labor Requirements

The manufacturing needs to produce 3000 subminiature metallized polycarbonate or metallized polysulfone capacitors in one eight hour shift per day are detailed in Table XL. These figures are based on the following rating breakdown per shift.

- 0.10 mid 100 VDC 500 pcs.
- 1.0 mfd 100 VDC 500 pcs.
- 4.0 mfd 100 VDC 500 pcs.
- 0.047 mfd 200 VDC 500 pcs.
- 0.33 mfd 200 VDC 500 pcs.
- 1.0 mfd 200 V1 C 500 pcs.

TABLE XL

MANUFACTURING REQUIREMENTS*

Operation	Equipment	No.	Operators	Area Square Feet
Winding	Winding Machine	6	6	300
Heat Treatment	Ovens	3	1/8	150
End Spray Preparation	None	•	1	100
End Spray	Spray Gun	1	1	200
End Spray Cleaning	None	-	1	100
Lead Attachment	Soldering Devices	2	2	100
100% Electrical Test	E.ect. Test Equipment	3	1 1/2	100
Assembly	None	-	1	100
Soldering	Soldering Devices	2	2	200
Filling	Vacuum Equipment	1	2	100
Soldering	Soldering Device	1	1	50
100% Inspect & Seal Test	Seal Test Equipment	2	1 1/2	150
100% Electrical Test	Elect. Test Equipment	3	2	300
** Burn-In	Ovens Power Supplies	1 2	1	200
100% Electrical Test	Elect. Test Equipment	3	2	300
Marking	Stamping Machine	1	1/2	50
Packaging	None	-	1	200
	Total		26 5/8	2700

^{*}Requirements necessary for the manufacture of 3000 Metallized Polycarbonate or Polysulfone Capacitors in one eight hour shift per day.

^{**}Requirements for 250 hour Burn-In of 3000 capacitors.

SECTION 5

CONCLUSIONS

- (1) Quality of the metallized polycarbonate and polysulfone film as received is most important in terms of ultimate low failure rate over long life time use of the capacitors. In particular, the uniformity of thickness, specific resistance in ohms per square for the metallization, shrinkage under thermal stresses, solvent or foreign particulate entrapment, and smoothness of slitting together with an adequate and uniform cleared margin area are all factors which must be controlled by incoming inspection and evaluation.
- (2) Shrinkage of film wound into sections through exposure to thermal stress at or somewhat above the maximum operating temperature of the finished capacitor is required for stability of parameters and high reliability.
- (3) Heat treatment of the wound section is essential to effect mechanical stabilization under high temperature use. This operation is necessary in order to shrink the metallized film and remove the

volatile entrapped solvents. Temperature selected must be equal to or somewhat above the rated operating temperature of the finished capacitor.

- of the solvent system used in the manufacturing process of the film. This must be removed to the maximum extent possible by the application of thermal stresses sufficient to release the volatile components of the system from the film. The length of time that the wound section is exposed to the thermal stress necessary to achieve this objective is dependent on the amount of entrapped solvent and the thickness of the film used. It is essential that characteristics of a supplier's film be determined, and adequate heat treatment developed. Continuous monitoring of lots through incoming inspection and evaluation is required. Less than satisfactory removal of the solvent system residuals will result in a time/temperature degradation of the electrical parameters of the finished capacitor.
- (5) Application of a burn-in to the finished capacitor is essential to remove from the population the capacitors with short life factors as either the result of intrinsic degradation factors randomly observed throughout films or possible minor damage to the section during the manufacturing and handling phase in production. Typically, burn-in which is usually a voltage stress over the maximum rating

of the capacitor is applied for a time duration chosen to develop short term degradation of electrical parameters at the highest rated temperature. Such a burn-in has been demonstrated to be the application of 140% of rated voltage for 250 hours at 125°C during the process improvement phase of this Production Engineering Measure.

- (6) Because polycarbonate and polysulfone films are exceedingly sensitive to the effects of ambient moisture resulting in unacceptable degradation of the electrical parameters of the capacitor, usually observed as a significant drop in insulation resistance, it is necessary to insure hermeticity by the use of glass-to-metal seals soldered into tubular metal section housings or cases. This method of construction was used on all parts tested under this Production Engineering Measure.
- relatively brief intervals to temperatures in excess of the maximum rated operating temperature of the device. This is due to the initial intrinsic characteristics of the film and the maximum operating temperatures established by the process in terms of section film shrinkage temperatures used during the manufacturing process. Metallized plastic film capacitors should never be exposed to or used in application at temperature in excess of the specified rating.

- (8) Based on the factors of experience gained during the performance of this program and consistent with the state-of-the-art relative to metallized polycarbonate film available from suppliers and manufacturing techniques, Slash sheets have been added by the Military Departments to MIL-C-39022. Most representative of the capacitor manufactured and tested under this Production Engineering Measure is MIL-C-39022/10 (EC). Similar is MIL-C-39022/9 (USAF) and MIL-C-83421 (USAF).
- (9) Metallized polycarbonate film capacitors manufactured under the proper process controls are capable of high reliability performance and low failure rate. Capacitors manufactured under this Production Engineering Measure demonstrated an extrapolated intrinsic failure rate of .001% per 1000 hours; but due to the contract modification reducing the number of metallized polycarbonate capacitors from 23,000 to 11,500, the achieved failure rate was calculated as .002% per 1000 hours at 90% confidence level.
- (10) Metallized polysulfone film capacitors manufactured under the proper process controls are also capable of high reliability performance and low failure rate. The experience gained during the performance of this contract indicate the need for improvement in the state-of-the-art relative to the consistency of quality of the metallized polysulfone film available from suppliers.

As a result of test equipment malfunction, the production lot test was terminated prior to the 10,000 hour end point. The achieved failure rate was calculated as .0056% per 1000 hours at 90% confidence level.

SECTION 6

PROGRAM RECOMMENDATIONS FOR ADDITIONAL EFFORT

- (1) With the successful conclusion of the test program demonstrating that high reliability metallized polycarbonate film capacitors could be produced by a state-of-the-art capacitor manufacturer using domestic source film it is apparent that no additional work effort or funding is required to produce either film or capacitor product.
- (2) Specification sheets have now been issued to MIL-C-39022 as /9 and /10 covering several variations of hermetically sealed metallized polycarbonate film and an additional specification MIL-C-83421 recently has been issued covering metallized polycarbonate film capacitors.
- (3) The Sprague Electric Company has qualification to Level "P",

 . 1% per 1000 hour failure rate, and supplies Established Reliability

 Capacitors using metallized polycarbonate film for military

 systems applications.

(4) This Production Engineering Measure demonstrated that polysulfone film as received is capable of providing long life reliable capacitors. However, lot uniformity has not been achieved and it is necessary that each lot be extensively evaluated before being used in quality capacitor construction. Additional basic film process work should be programmed to develop product uniformity. Additional effort should be programmed in developing the best capacitor manufacturing techniques.

SECTION 7

CONFERENCES, PUBLICATIONS AND REPORTS

7.1 Monthly Reports

A total of eighty-seven monthly reports were prepared, submitted, approved and distributed during the contract period.

7.2 Quarterly Reports

Twenty-eight Quarterly Reports were prepared, submitted, approved and distributed during the contract period.

7.3 PERT Chart

A PERT Chart covering the work to be performed under this contract was prepared, submitted to and approved by USAECOM on September 11, 1967.

7.4 Inspection and Quality Control Plan

An Inspection and Quality Control Plan was submitted to and approved by USAECOM on June 9, 1970.

7.5 First Article Test Reports

The First Article Test Report for Polycarbonate Capacitors was submitted to USAECOM on May 19, 1970 and approved on June 16, 1970.

The First Article Test Report for Polysulfone Capacitors was submitted to USAECOM on March 5, 1973. Approval of this report was received on larch 20, 1973.

7.6 Conferences

A Post-Award Conference was held on the PEM Program for Reliability Improvement of Metallized Polycarbonate Capacitors at the Sprague Electric Company's Dearborn Facility in Orlando, Florida on July 13, 1967. Attending the meeting were:

Government Representatives	Sprague Electric Company
Mr. R Thompson	Mr. E. D. A. Geoghegan
Mr. M. Sullivan	Mr. D. H. Smith
Mr. S. Levy	Mr. R. S. Boyles
Mr. R. Heuermann	Mr. J. H. Michels
Mr. E. M. Soloman	
Mr. S. M. Bernstein	
Mr. W. A. McGurk	
Mr. J. A. Smalley	
Mr. R. J. Weber	

On November 21 and 22, 1968 a conference was held at the Dearborn Facility for the purpose of discussing the progress of the program. Attendees at this meeting were:

Government Representatives	Sprague Electric Company
Mr. R Thompson	Mr. E. D. A. Geoghegan
Mr. D. Pain	Mr. D. H. Smith
	Mr. R. S. Boyles
	Mr I H Michels

On January 10, 11 and 12, 1973 a technical meeting was held to review the status of the contract items and problems related thereto. The meeting were held at Sprague Electric Company's Dearborn Facility at Orlando, Florida and the following were in attendance:

Government Representatives	Sprague Electric Company
Mr. R. Thompson	Mr. W. Lamphier
Mr. R. Joiner	Mr. J. Michels
	Mr. H. Pentecost
	Mr. D. Smith
	Mr. D. Dicks

SECTION 8

DISTRIBUTION LIST

Copies	
1	Director Electronics Components Laboratory Fort Monmouth, New Jersey 07703 ATTN: AMSEL-KL-E (Mr. H. Stout)
1	Commanding General U. S. Army Electronics Command Fort Monmouth, New Jersey 07703 ATTN: AMSEL-PP-EM (Mr. F. Hochberg)
1	Commander Rome Air Development Center Griffiss Air Force Base, New York 13442 ATTN: Mr. D. F. Barber
12	Commander Defense Documentation Center Cameron Station Alexandria, Virginia 22314 ATTN: TISIA-1
2	U. S. Army Electronics Command Green Acres Building Fifth Floor, OA Fort Monmouth, New Jersey 07703 ATTN: AMSEL-PP-I-P-I-1 (Mr. Arthur Rabin)

Copies	
1	Department of the Navy Naval Electronics Systems Command Washington, D. C. 20360 ATTN: Mr. Leon Neal, Code 051432
1	NASA Goddards Space Flight Center Quality Assurance Branch Greenbelt, Maryland 20371 ATTN: Mr. H. Lunchick, Code 323
1	Cornell-Dubilier Electric Corporation 1605 Rodney-French Blvd. New Bedford, Massachusetts 02744 ATTN: Mr. D. Sylvia
1	General Electric Company P. O. Box 158 Irmo, South Carolina 29063 ATTN: Mr. K. Norwood
1	Nytronics, Inc. Capacitor Division Darlington, South Carolina 29532 ATTN: Warrington L. Williams
1	Aerovox Corporation 740 Belleville Avenue New Bedford, Massachusetts 02745 ATTN: Mr. A. Kalstein
1	Mallory Capacitor Company 3029 Washington Avenue Indianapolis, Indiana 46204 ATTN: Mr. David Bell
1	TRW Capacitor Division 112 West First Street Ogaliala, Nebraska 69153 ATTN: Mr. Loren C. Kolste
1	Gudeman Company 340 West Huron Street Chicago, Illinois 60610 ATTN: Mr. Leo Grimm

Copies	
1	Marshall Industries 1960 Walker Avenue Monrovia, California 91016 ATTN: Mr. James East
1	The Potter Company P. O. Box 337 Wesson, Mississippi 35.91 ATTN: Mr. H. Mutz
2	The Advisory Group on Electronic Devices 201 Varick Street New York, New York 10014
1	San Fernando Electric Manufacturing Company 1509 First Street San Fernando, California 91340 ATTN: Mr. Richard Griffiss
1	Erie Technological Products, Incorporated 644 West 12th Street Erie, Pennsylvania 16501 ATTN: Mr. H. S. Herrick
1	Hopkins Engineering Company 12900 Foothill Blvd. San Fernando, California 91342 ATTN: Mr. N. L. Bevan
1	Balco Capacitors Division 307 Washington Street Orange, New Jersey 07050 ATTN: Mr. Dan Feency
1	Component Research Company, Incorporated 1717 Nineteenth Street Santa Monica, California 90404 ATTN: Mr. D. Kellerman
1	Southern Electronics Corporation 150 West Cypress Avenue Burbank, California 91502 ATTN: Mr. R. W. Koehler

Copies	
1	Westinghouse Electric Corporation R&D Center Beulah Road, Churchill Boro Pittsburgh, Pennsylvania 15209 ATTN: Mr. Joseph Engel
1	U. S. Air Force Aeronautical Systems Division Wright-Patterson Air Force Base, Ohio 45324 ATTN: Mr. R. C. Faust, ASNPS-20
1	U. S. Semcor 3540 West Osborn Road Phoenix, Arizona 85019 ATTN: Mr. M. Restivo
1	WESCO Electrics! Company, Incorporated 27 Oliver Street Greenfield, Massachusetts 01301 ATTN: Mr. R. Kugell
1	Sangamo Electric Company Eleven South Converse Street

Springfield, Illinois 62702

Mr. K. McGee

Peter J. Schweitzer Division Kimberly-Clark Corporation Lee, Massachusetts 01238 ATTN: Mr. J. W. Tosch

ATTN:

SECTION 9

IDENTIFICATION OF PERSONNEL

9.1 Identification of Personnel

The following is a categorized list of personnel and the hours contributed to the contract.

Personnel	Hours
Engineering	1927,00
Ascistant Technical	2645.25
Technical Writing	463.00
Clerical	179.25
TOTAL	5214,50